AVIATION WEEK

A McGRAW-HILL PUBLICATION

JULY 25, 1955

50 CENTS

Inlet air diffuser control

Toward ever-better jet engine performance

THE AERODYNAMIC DESIGN of engine inlet diffusers for supersonic aircraft poses increasing problems as mach numbers advance.

Fixed diffusers designed for optimum pressure recovery at a given high mach number may be so inefficient at a lower mach number as to render it impossible for the aircraft to reach its design speed.

One solution for aircraft designed to operate over this wide speed range is the variable inlet diffuser. Such a diffuser, controlled to the proper parameters to achieve maximum pressure recovery and mass air flow matched to engine requirements, insures optimum engine performance at all mach numbers.

A properly positioned shock system will solve most, if not all, of the problem. The oblique shock wave shown in the wind tunnel photo is part of the shock system of an axial-symmetric inlet. Accurate control of shock wave position can be accomplished both in this type of inlet —and those which are essentially two dimensional.

Such inlet air controls are now being built by Honeywell, so that higher speeds and greater range can be achieved—and so maximum service life can be obtained from the engines.

The control of inlet air flow is another Jet Age problem being solved at Honeywell.

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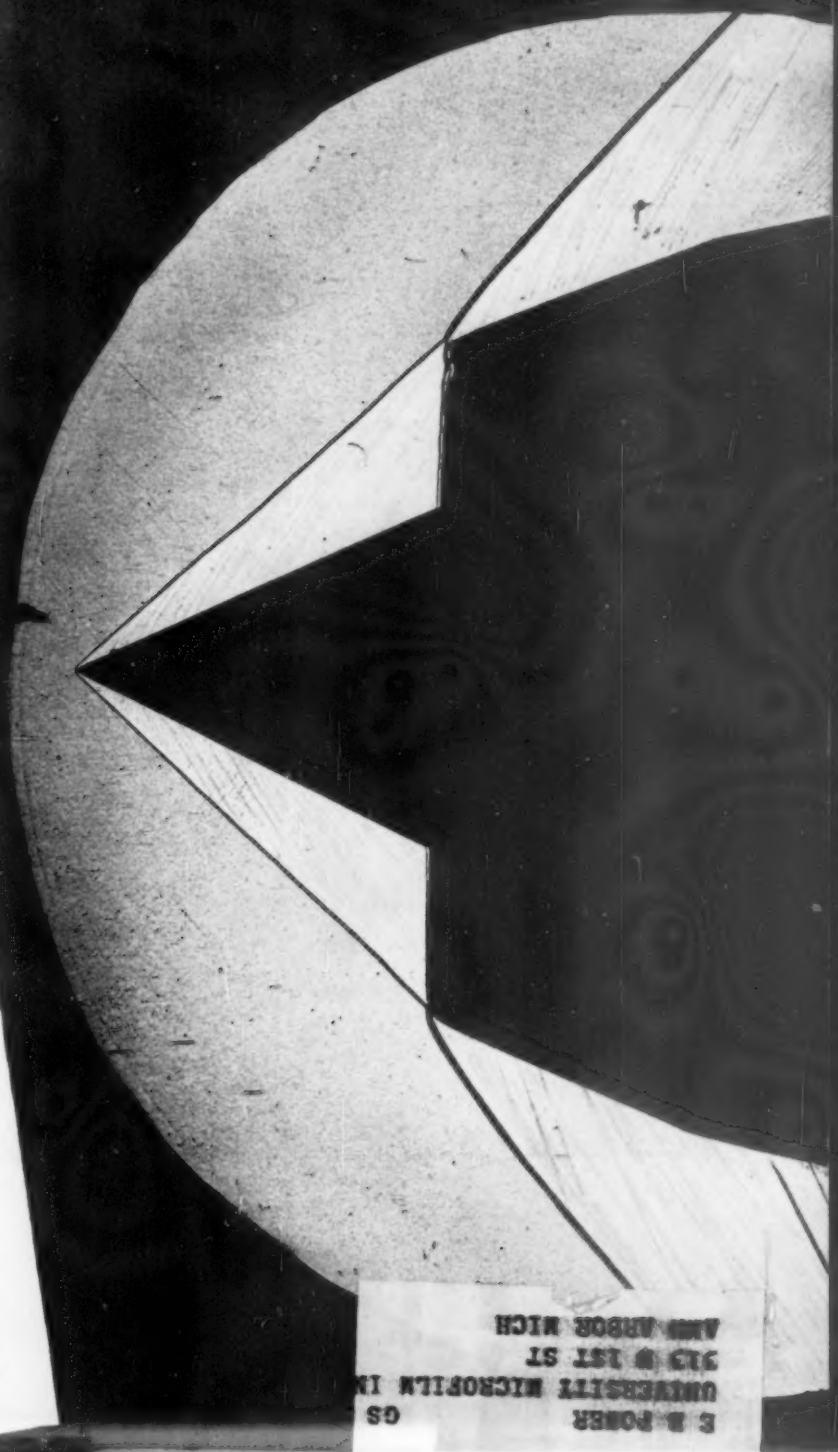

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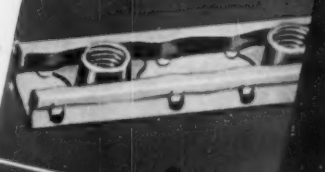

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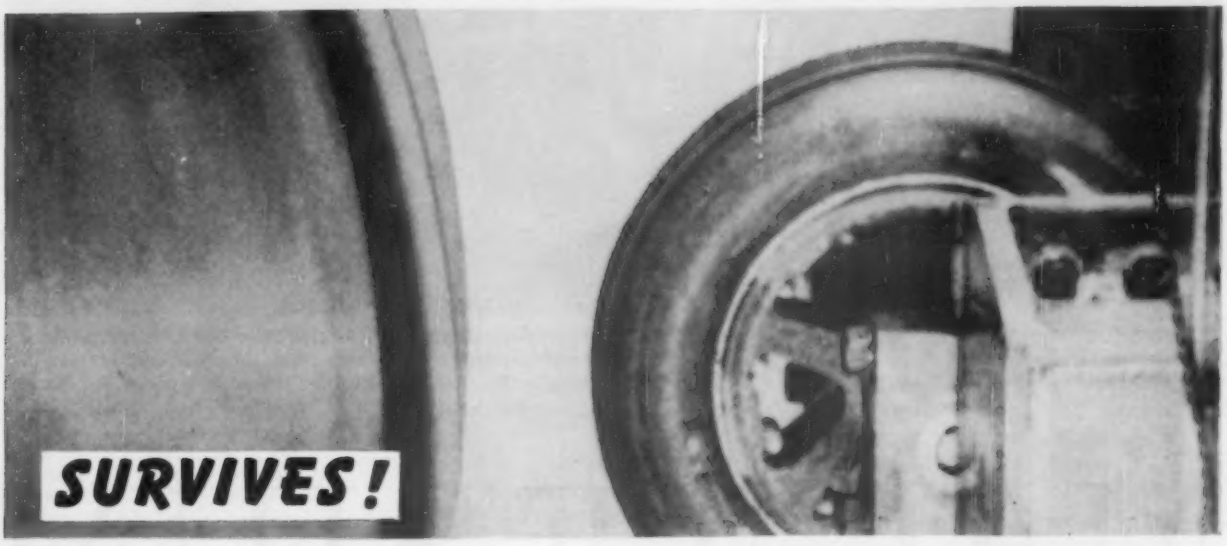
RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



B.F.Goodrich successfully develops world's first 300 mph airplane Tubeless Tire

B. F. GOODRICH, inventor of the Tubeless Tire, has developed the first Tubeless Tire capable of withstanding landing speeds of 300 mph. Designed for ultra-high-speed Navy use, the new airplane Tubeless Tire was qualified by a series of grueling landing tests on B. F. Goodrich's new 300 mph dynamometer in Akron, Ohio.

To simulate actual landings, the new B. F. Goodrich 300 mph Tubeless Tire was slammed against the dynamometer's whirling flywheel under 10,000 lbs. load (top left). Instantly it developed speeds up to 4,000 rpm—a combination of impact, friction and centrifugal force that would disintegrate an ordinary tire. What happened? The terrific force and speed temporarily deformed the tire into a series of standing waves (top right). But even after 16 of these landings—far more than required—the new B. F. Goodrich airplane Tubeless Tire was still good for more (bottom).

This new 300 mph Tubeless Tire is the latest addition to the B. F. Goodrich airplane Tubeless Tire line. Already in military and commercial service, B. F. Goodrich Tubeless Tires save as much as 75% of tube weight. They give safer take-offs and landings because tube troubles are eliminated.

Instead of an inner tube, the B. F. Goodrich Tubeless Tire has a patented inner liner that's part of the tire itself. Result: there's no tube chafe or leak, shift or bunch. No tube to add weight. And there's only one unit to mount, maintain and warehouse.

The new 300 mph airplane Tubeless Tire is another example of B.F.Goodrich leadership in Tubeless Tire research and development. *The B.F. Goodrich Company, Aeronautical Sales, Akron, Ohio.*

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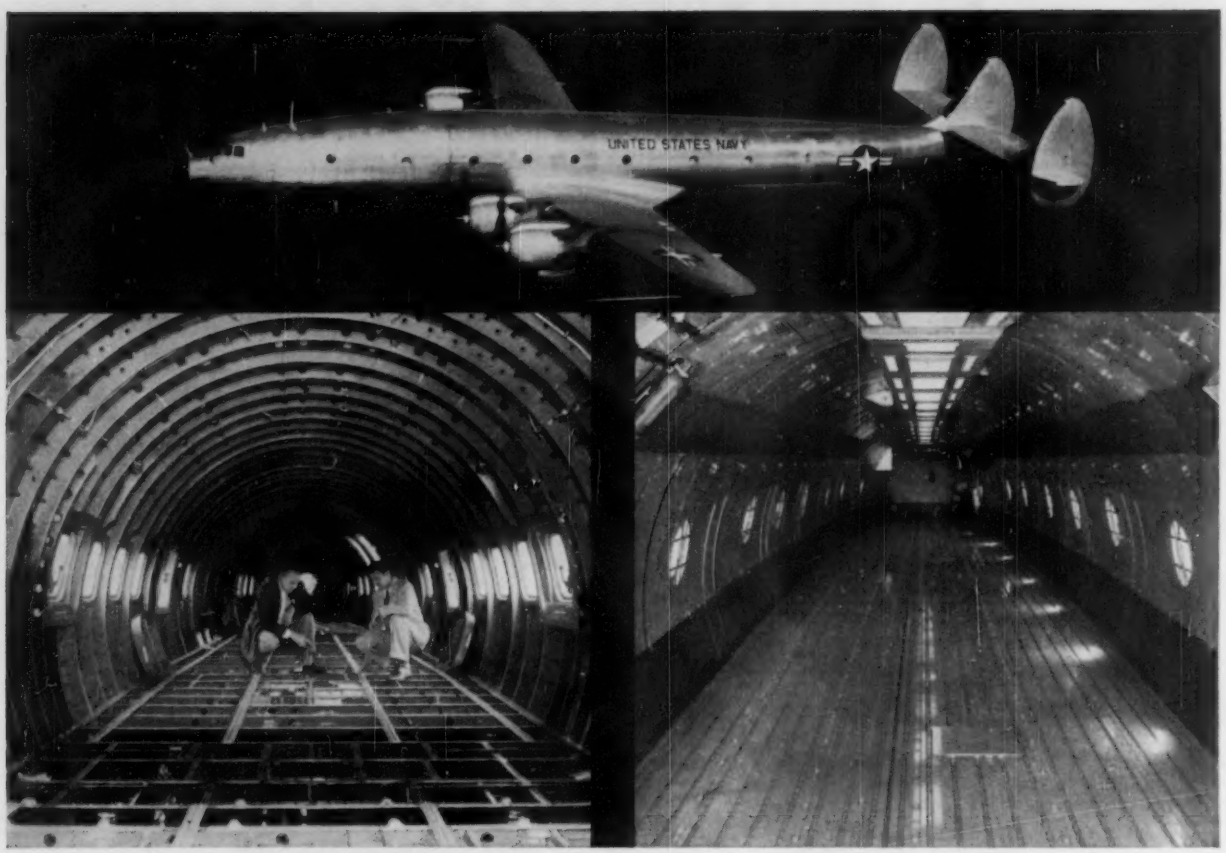

EXTRUDED LIGHTWEIGHT MAGNESIUM BEAMS supply added cargo flooring strength without weight penalty for greater pay loads and greater speed of Lockheed Super Constellation, C-121-C.

SIMPLIFIED DESIGN OF MAGNESIUM EXTRUSIONS provides a rugged flooring for this huge cargo ship that's not only light in weight—it's easy to clean and maintain, too.

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VOL. 63 NO. 4

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Aviation Week is served by Press Association Inc., a subsidiary of Associated Press.

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57,717 copies of this issue printed

AVIATION WEEK • JULY 25, 1955 • Vol. 63, No. 4
Member ABP and ABC

Published weekly by the McGraw-Hill Publishing Company, James H. McGraw (1860-1948), Founder. Executive Editorial, Advertising and Subscription Offices: McGraw-Hill Building, 330 West 42nd Street, New York 36, N. Y. Publication Offices: 99-129 North Broadway, Albany 1, N. Y. Donald C. McGraw, President; Paul Montgomery, Executive Vice President; Joseph A. Gerardi, Vice President and Treasurer; John J. Cooke, Secretary; Nelson Bond, Executive Vice President, Publications Division; Ralph B. Smith, Vice President and Editorial Director; Joseph H. Allen, Vice President and Director of Advertising; J. E. Blackburn, Jr., Vice President and Circulation Director.

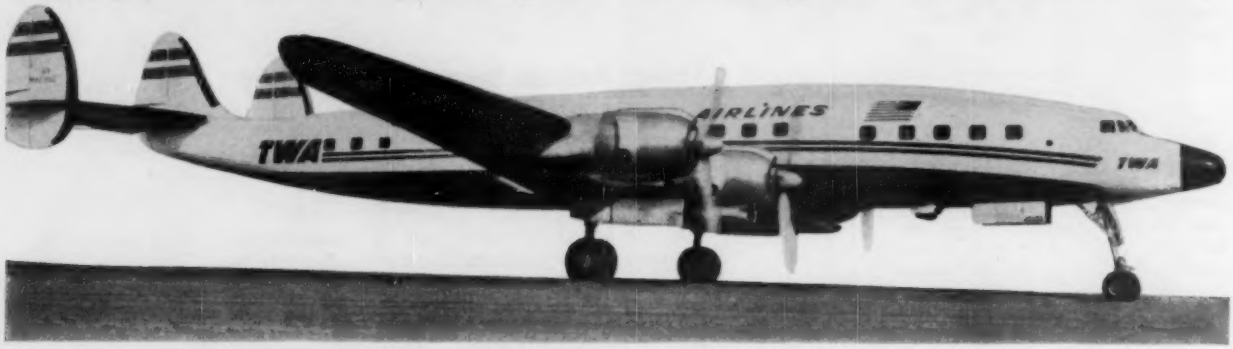
Subscription: Address correspondence to AVIATION WEEK—Subscription Service, 99-129 North Broadway, Albany 1, N. Y. or 330 West 42nd St., New York 36, N. Y. Allow 10 days for change of address.

Subscriptions are solicited only from persons who have a commercial or professional interest in aviation. Position and company connection must be indicated on subscription orders.

Single copies 50¢. Subscription rates—United States and possessions, $6 a year; $9 for two years; $12 for three years. Canada $8 a year; $12 for two years; $16 for three years, payable in Canadian currency at par. Other Western Hemisphere and the Philippines $10 a year; $16 for two years; $20 for three years. All other countries $20 a year; $30 for two years; $40 for three years. Entered as second class matter July 16, 1947, at the Post Office at Albany, N. Y., under Act of Mar. 3, 1879. Printed in U. S. A. Copyright 1955 by McGraw-Hill Publishing Co., Inc.—All Rights Reserved. Cable Address: "McGraw-Hill New York." Publications combined with AVIATION WEEK are AVIATION, AVIATION NEWS, AIR TRANSPORT, AERONAUTICAL ENGINEERING and AIRCRAFT JOURNAL. All rights to these names are reserved by McGraw-Hill Publishing Co.

New TWA Super G Constellation!

Equipped with Macwhyte "Hi-Fatigue" Control Cable



Installation of "Hi-Fatigue" cable in the TWA Super G Constellation leading to flight engineer's station.

"Hi-Fatigue" cable installation going to overhead controls.

The new TWA Super G Constellation is one of Lockheed's latest four-engine transport planes for commercial use. Powered by turbo-compound engines, the transport cruises at 335 miles per hour. Measuring 116 feet in length, the aircraft carries 66 passengers. "Hi-Fatigue" cable is installed.

Macwhyte makes a complete line of sizes and types of "Hi-Fatigue" aircraft control cable in Galvanized, Tinned, and Stainless Steel. "Safe-Lock" Terminals for swaging are manufactured according to government standards. Terminals may be purchased loose or attached.

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NEWS DIGEST

845 F-100C SUPER SABRE DELIVERIES are being made by North American Aviation to the Tactical Air Command, confirming Aviation Week's prediction that USAF would receive the first of this fighter-bomber version in July. Able to fly long range atomic bombing missions and deliver its load at supersonic speeds, the F-100C is equipped with an inflight refueling system, an electronic bomb sight and provisions for more droppable fuel tanks and weapons under its wings than the F-100A day superiority fighter. Addition of the refueling system will permit the F-100C also to escort long range bombers. It is powered by a P&WA J57 jet engine with afterburner.

Domestic

Nuclear research and development by General Dynamics Corp. will center at a new $10 million laboratory. The facility will be a part of General Dynamic's long range atomic program that will be directed by Dr. Frederic de Hoffmann, appointed vice president and general manager of the Atomic Division last year. One main objective of the laboratory will be to reduce reactor costs through simplified design and increased efficiency. Construction will start before the end of 1955.

First Convair B-36 to complete the second phase of SAM-SAC (Specialized Aircraft Maintenance-Strategic Air Command) at the builder's Fort Worth plant has been delivered to USAF. Second cycle of the modernization and recondition program covers fuselage, crew compartments, bomb bays, landing gear and wing fuel tanks. Other half of the B-36 was gone over in the first phase, started by Convair two years ago.

Last three DC-3s operated by Pan American World Airways are being replaced with Convair-Liners. The three were flying PAA's Central American routes between Panama and El Salvador.

Continental Aviation & Engineering Corp. received additional USAF orders for J69 turbojet engines, starter generators and special tools. Total value of the new contracts: $3,632,184.

Air Research and Development Command appointed Col. Lee W. Fulton as director of procurement effective Aug. 1. He will replace Col. J. R. Martin, who resigned from USAF to enter private business. Col. Fulton had been assigned to the Air Materiel Command.

New York Airways carried its 20,000th passenger July 18. Since the helicopter airline started scheduled flights October 1953, its five Sikorsky S-55s have logged more than a million miles and 16,500 scheduled air hours without incident.

Research and development on air-sea rescue containers for small planes is being carried out by Beech Aircraft Corp. for USAF's Wright Air Development Center. After the small containers are ejected from pylons beneath the rescue craft's wing, they spill out emergency supplies that float down by parachute.

Braniff Airways' Convair 340 crashed on the final leg of an instrument landing approach to Chicago's Midway Airport July 17, killing 22 persons and injuring 21. Letting down through fog that had reduced airport visibility to a half mile, the transport hit a 15-foot electric sign and plowed through a fence on Midway's north boundary.

Financial

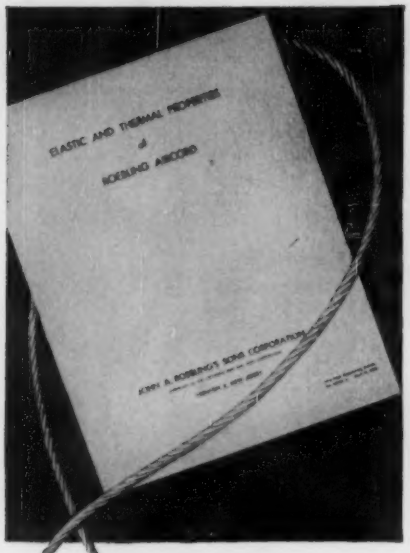
Pacific Airmotive Corp. reported a net loss of $343,980 for the six months ended May 31, compared with a $129,570 deficit for the same period last year consolidated sales declined to $8,176,305 from $8,633,992.

Western Air Lines declared a regular 15-cent dividend, payable Aug 15 to stockholders of record Aug. 1.

International

Folland Gnat made its first flight July 18 at Bascombe Down, England, and a company spokesman said the lightweight jet fighter took off after an "extraordinarily short run." Britain's Ministry of Supply has ordered a small quantity of Gnats for developmental tests.

Air France took delivery of its first 1049G Super Constellations ordered from Lockheed Aircraft Corp. The new transport, equipped with two 600-gal. wingtip tanks, will be used on trans-Atlantic flights. Ten are on order.



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AVIATION CALENDAR

Aug. 5-7—Experimental Aircraft Assn., third annual Fly-In and Convention, Curtiss-Wright Airport, Milwaukee.

Aug. 8-10—Institute of the Aeronautical Sciences, second National Turbine-Powered Air Transportation Meeting, Olympic Hotel, Seattle.

Aug. 10-14—Air Force Assn., Convention and Airpower Panorama, San Francisco.

Aug. 15-17—Society of Automotive Engineers, West Coast Golden Anniversary Meeting, Hotel Multnomah, Portland, Ore.

Aug. 19-21—Antique Airplane Assn., second annual Convention and Fly-In, Municipal Airport, Ottumwa, Iowa.

Aug. 22-23—Symposium on Electronics and Automatic Production, sponsored by Stanford Research Institute and the National Industrial Conference Board, Sheraton-Palace Hotel, San Francisco.

Aug. 22-24—American Rocket Society and Northwestern University, Gas Dynamics Symposium, Evanston, Ill.

Aug. 24-26—Western Electronic Show and Convention (WESCON), Civic Auditorium and Fairmont Hotel, San Francisco.

Aug. 24-26—International Ignition Conference, conducted by Scintilla Division of Bendix Aviation Corp., Sidney, N. Y.

Sept. 3-5—Twenty-ninth National Aircraft Show, Philadelphia International Airport, Philadelphia, Pa.

Sept. 3-9—Aircraft Owners & Pilots Assn., eighth annual Roundup Flight Cruise, New York to Bermuda.

Sept. 6-11—Society of British Aircraft Constructors, Aircraft Show and Flying Display, Farnborough, England.

Sept. 6-17—National Machine Tool Builders' Assn., Production Engineering Show and Machine Tool Show, Navy Pier and International Amphitheatre, Chicago.

Sept. 12-16—Instrument Society of America, Instrument-Automation Conference and Exhibit, Shrine Exposition Hall and Auditorium, Los Angeles.

Sept. 17—Institute of Radio Engineers, Symposium on Automation, Cedar Rapids, Iowa.

Sept. 28-29—American Institute of Electrical Engineers and Institute of Radio Engineers, Park Sheraton Hotel, Detroit, Mich.

Oct. 3-5—Eleventh annual National Electronics Conference, Hotel Sherman, Chicago.

Oct. 4-6—Eleventh annual Aircraft Spark Plug and Ignition Conference, sponsored by Champion Spark Plug Co., Secor Hotel, Toledo, Ohio.

Oct. 5-7—National Business Aircraft Assn., eighth annual Meeting and Forum, Sheraton-Cadillac Hotel, Detroit, Mich.

Oct. 5-7—1955 National Airports Conference, sponsored by American Association of Airport Executives and University of Oklahoma, Norman, Okla.

Oct. 11-15—Society of Automotive Engineers, Golden Anniversary Aeronautic Meeting, Aircraft Production Forum and Aircraft Engineering Display, Hotel Statler, Los Angeles.

Oct. 17-21—International Air Transport Assn., 11th annual general meeting, Waldorf-Astoria Hotel, New York.

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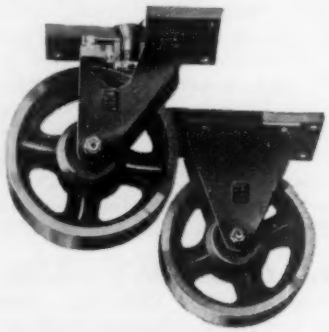

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WHO'S WHERE

In the Front Office

Mel E. Maurer, president of Meridan Corp.'s Flex-O-Tube Division, Inkster, Mich. An aeronautical engineer, Maurer has been associated with Lockheed Aircraft Corp., Douglas Aircraft Co.'s El Segundo Division, Chance Vought Aircraft and Northrop Aircraft.

Brig. Gen. Willis R. Slaughter (USA Ret.), vice president of W. L. Maxson Corp., New York.

Curtis B. Hoffman, vice president-sales of Brush Electronics Co., Cleveland.

Dr. B. D. Thomas, vice president of Battell Institute, Cleveland. Other new vice presidents: **David C. Minton, Jr.,** and **John S. Crout.**

Devereaux Martin, vice president-engineering of Viking Instruments, Inc., East Haddam, Conn.

Siegfried Susskind, vice president-engineering and electronic products for Waldorf Instrument Corp., Huntington, N. Y.

Honors and Elections

Marvin Pitkin, plans manager of Glenn L. Martin Co.'s office of development planning, received Navy's Meritorious Civilian Service Award for "achievements in inaugurating and developing the air-launched missile program" while at the Bureau of Aeronautics from January 1947 to March 1955.

R. Lorimer Weir, financial controller of British European Airways, elected chairman of International Air Transport Assn.'s Financial Committee.

John Anderson, vice president-operations for Scandinavian Airlines System, appointed chairman of the International Airline Development Committee that will consult with Port of New York Authority on construction of the projected new terminal building at Idlewild International Airport.

Changes

Dr. Lowell M. Hollingsworth, director of the Electronics Research Directorate at the Air Force Cambridge Research Center.

Robert A. Strieby, manager of Kaman Aircraft Corp.'s new military operations research department, Bloomfield, Conn.

D. Le Roy du Vivier, North American general manager for Sabena Belgian World Airlines.

John R. Joerger, sales manager of the new Aircraft Machine Division of Kearney & Trecker Corp., Milwaukee.

Jack J. Gilderoy, manager of United Air Lines' new temporary maintenance facility at Denver.

Dr. Newman A. Hall, head of the Graduate Division of New York University's College of Engineering. Dr. Hall has held research and engineering position with Chance Vought Aircraft and was a member of the technical advisory board on the Air Force-Atomic Energy Commission aircraft nuclear propulsion project.

Henry Schwiebert, assistant chief engineer of Teletronics Laboratory, Inc., Westbury, N. Y.

INDUSTRY OBSERVER

► USAF is interested in a fighter version of the Douglas A4D Skyhawk lightweight atomic bomb carrier now being built by the El Segundo Division for the Navy. Recent informal attempt to beat the world speed record for three kilometers, now held by the Douglas F4D Skyray, with the Skyhawk was aborted due to dive brake troubles.

► **Pratt & Whitney Aircraft J75 15,000-lb.-thrust turbojet is scheduled to make its first flight in an operational aircraft next spring.**

► General Electric's J79 turbojet will get its first flight testing in an aircraft other than a flying test bed rig with a Douglas F4D now being modified to take the engine.

► **North American Aviation has submitted a proposal to USAF for a jet powered version of its T-28 for a subsonic training plane.**

► English Electric is working on a new version of the Canberra light bomber and night intruder designed to fight at 63,000 ft. altitude. The high altitude Canberra would be powered by advanced version of the Bristol Olympus turbojet.

► **Pratt & Whitney Aircraft has put definite altitude limitations on cruise operations with its J57 turbojet. USAF and Navy fighters equipped with the J57 are currently restricted to cruising altitudes more than 5,000 ft. below the operational ceilings of the British Vulcan and Victor bombers.**

► Cessna 180 will make an attempt to get to 50,000 ft. piloted by a West Coast sailplane enthusiast late next winter. Plan is to take the oxygen-equipped lightplane to 25,000 ft. over the Sierra Nevada mountains and then ride a standing wave to 50,000 ft.

► **USAF pilots flying the North American F-100 report they can rock each other with sonic booms. "It's like slamming into turbulence at high speed," one pilot told Aviation Week. "We feel that a smaller plane could be knocked down by the passing blast of an F-100, but it wouldn't really damage another Super Sabre." USAF has been experimenting with the blast effects of several supersonic booms from fighters diving in formation on a single target to determine possible use of the boom as a weapon.**

► Airlines are jockeying hard for position on the Lockheed, Douglas and Boeing turbine powered airliner production lines with the big trunklines enjoying a definite advantage even over smaller airlines ready to make definite commitments now. First Douglas commitment for DC-8 delivery was to National Airlines for initial planes ready by August 1959 (AW July 11, p. 108).

► **Avro CF-100 Canuck all weather fighters will equip nine Royal Canadian Air Force Squadrons by the end of this year for local air defense, according to Canadian Defense Minister Ralph Campney. In addition, four RCAF squadrons equipped with CF-100s will be sent to Europe for NATO defenses.**

► Canadian government has officially confirmed the flight testing of the Velvet Glove air-to-air missiles (AW March 14, p. 320) at Cold Lake, Alberta and at Valcartier Air Base near Quebec.

► **Cornell Aeronautical Laboratory is testing supersonic propellers with diameters of more than four feet at 2,000 hp. and 7,500 rpm.**

► Next round of jet powered target drones in development will aim for 60,000 ft. altitude to match operational capabilities of fighter aircraft against which they will be fitted.

► **Canada's aviation industry employs 41,325 people in 43 plants. Aircraft and components manufactured last year were valued at approximately $400 million.**

Washington Roundup

Slow Acceleration

Plans for accelerating production of the supersonic McDonnell F-101 and Lockheed F-104 are still being discussed by Air Force and Defense Department a month after USAF Secretary Harold E. Talbott advised the Senate that production of the two aircraft would be speeded.

Observers were puzzled by Defense Secretary Charles E. Wilson's remark at Quantico, Va., that he did not know about any increase in production for the two planes.

Air Force quickly explained that the acceleration proposal had not been shown to Sec. Wilson when he made the statement, "but it has now."

"Funds for the speed-up will probably be obtained from other programs," an Air Force spokesman told AVIATION WEEK. "We have no plan at the present time to ask for more money."

The re-programming operation was given as the reason for the delay in effecting acceleration. USAF said the increase in production would be substantial.

"We don't think there is any chance that the acceleration in production will be turned down by Mr. Wilson," USAF spokesmen said. "It's just a matter now of agreeing upon the best way to finance the job."

Sec. Wilson also told newsmen in Quantico that the decision on boosting Boeing B-52 production was made a "year or a year and a half ago." This is at variance to earlier statements when he said an increase in production was not being considered at the time of the Russian May Day air displays.

Congress voted $356 million for the B-52 production increase after AVIATION WEEK revealed the advances made by Russian airpower.

Gas Tax Victory

Airlines and other aircraft users won a victory when the House Public Works Committee decided not to make a boost in the gasoline tax from two to three cents a gallon applicable to non-highway users (AW July 18, p. 17). The gas boost provision was tacked onto the multi-billion dollar roads construction bill by the House committee, as a method of financing. The provision was not included in the measure passed by the Senate.

Air Transport Assn.'s counsel, Stuart Tipton, estimated that the one cent boost would add over $10 million annually to the scheduled airlines' gas bill.

Scheduling Scrap?

A new argument over flight scheduling may develop as Capital Airlines puts its new Viscounts into service. Some observers claim Capital is stretching the Viscount's capabilities too far in the schedules it proposes. American Airlines questioned Capital President J. H. Carmichael sharply at New York-Florida route case hearings on Capital's proposed New York-Miami schedules. Carmichael defended the schedules as realistic, but refused an American Airlines demand for specifications of the Viscount 700D with the Dart 510 engine. American wouldn't compete with Capital on the North-South route, but they do compete between Washington and Chicago where Capital is scheduling the Viscount for the same flight time as American Airlines' DC-7 service.

The potential scheduling battle comes just as the dispute over transcontinental nonstop schedules is being ironed out. A firm CAB decision to apply a 65% schedule reliability standard could settle this and other similar situation before they blossom into the problem the transcontinental schedules became.

'Confidential' Hound

Publication by AVIATION WEEK of a photograph showing a public display flight of Russian Hound helicopters over Tushino Airport (AW July 18, p. 16) caused consternation among Air Force intelligence officers last week. They said the picture was classified "confidential," demanded to know how it had been obtained.

Source of the picture was Sovfoto, official Russian picture agency, which distributed the photo to the press. Intelligence experts, unabashed, still retain a "confidential" classification on their copies of the picture.

Air Policy Review

Consideration of civil aviation policy, started by the Senate Commerce Committee more than a year ago, has changed to the House Commerce Committee.

Senate Commerce Committee decided to postpone further consideration of omnibus legislation, re-writing the 1938 Civil Aeronautics Act, until next year.

House Commerce Committee held a session with Rep. Hale Boggs (D.-La.) to decide how and when to proceed with its review. Boggs has proposed a special committee to make a thorough review of air policy, but this project was blocked by the Rules Committee after Rep. Percy Priest, chairman of House Commerce, assured that the review would be made by his committee.

Wilson on Air Power

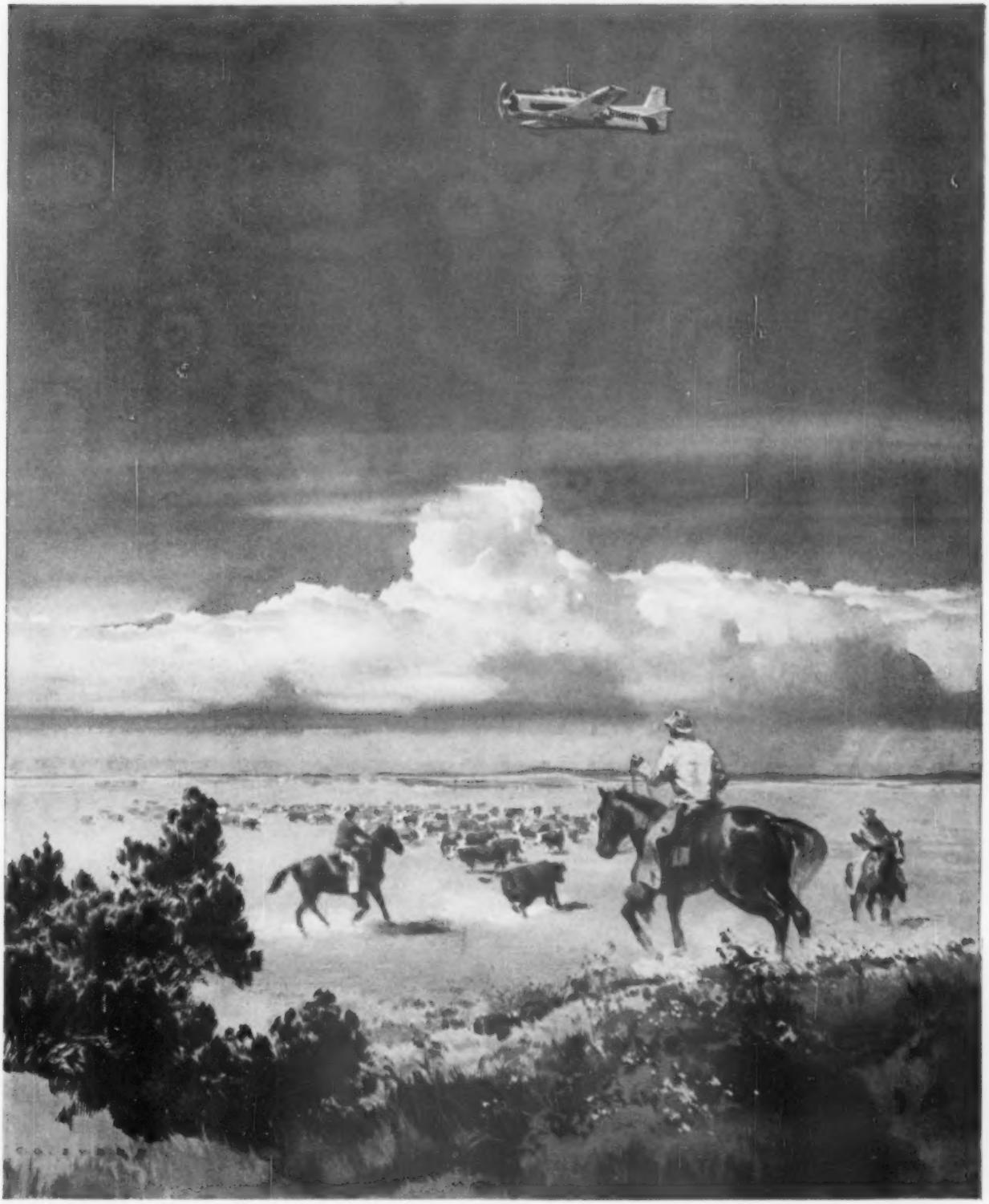
Members of the Military Applications Subcommittee on Atomic Energy will make an attempt to get categorical answers from Secretary of Defense Charles E. Wilson on 12 specific questions aimed at clarifying the relative position of U. S. and Soviet air power at an executive session this week. The questions were put to Wilson by Sen. Henry Jackson (D.-Wash.), chairman of the subcommittee (AW July 11, p. 17). Wilson declined to answer to question publicly or in written form.

Commerce Censorship

Rep. Robert Mollohan (D.-W. Va.) blames military influence on Commerce Department censorship activities. He observed in a public speech:

"The still widening influence of the military would seem to pervade every branch of the federal government, frequently with results that clearly and demonstrably do not serve the public interest. Today, even so plebeian an agency as the Department of Commerce now attempts to clamp voluntary censorships upon unclassified developments in scientific and industrial fields where exchanges of information have heretofore always served to advance our national progress."

—Washington staff



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AVIATION WEEK

VOL. 63, NO. 4

JULY 25, 1955

Talbott Business Connection Questioned

Senators report Secretary's income from New York industrial management company is 'substantial.'

By Katherine Johnsen

Washington, D. C.—A committee of Congress pondered the question last week as to whether a "conflict of interest" law is being violated—in letter or spirit—by Air Force Secretary Harold Talbott's "special partnership" in the industrial management concern, Paul B. Mulligan and Co. of New York City.

After a two hour "conference" with Talbott, the Senate Permanent Investigating Subcommittee, headed by Sen. John McClellan (D.-Ark.) delayed a decision as to whether public hearings were warranted. The session was held in McClellan's office. It was preceded by a two hour session between Talbott and the subcommittee's counsel, Robert Kennedy.

Committee members indicated to AVIATION WEEK that a change in Talbott's relation with the firm would be insisted upon. If this could be worked out, they hinted, the matter might be amicably settled.

Sees No Conflict

These seem to be the key points:

• **Talbott** received a "substantial" income from the Mulligan firm, in which he and Mulligan are the two partners. It amounts to approximately half the net profit, after deduction for Mulligan's salary. The business of the firm has increased "measurably" since Talbott became Secretary of the Air Force. Committee members pointed out, however, that there is no firm evidence to show that this can be attributed to Talbott's position.

• **Mulligan and Co.** has had no direct defense contracts. Only a "small percentage" of the work of its clients is for the Defense Department. Talbott saw no conflict between his interests in the success of the firm and his performance as Air Force Secretary, senators reported.

Committee members, though, observed that "even if only five or six per cent of firm's business were with Defense Department, this could be substantial."

• **Talbott acknowledged** his connection with the Mulligan firm when his nomination was up for confirmation by the Senate Armed Services Committee in February, 1953. But this was overshadowed by the committee's concern with Talbott's other connections and stock holdings. Talbott's prospective earnings from the firm or details on its activities were never developed at the armed services sessions.

"The Secretary flatly told the committee at that time he was to be a special partner with the Mulligan firm, so it cannot be said that there was an effort on his part to hide anything," Chairman McClellan said.

• **Before becoming** USAF Secretary, Talbott had a long connection with one of the current active accounts of the Mulligan Company—Electric Auto-Lite Co. He was a director and chairman of the finance committee. On becoming secretary, he also divested himself of 8,000 Electric Auto-Lite shares which he had held for 20 years.

• **Talbott, according to reports,** has acknowledged recommending the services of the Mulligan firm to the president of Baldwin-Lima-Hamilton Co. It is general knowledge that the firm is participating in Defense Department electronics work and is interested in entering the guided missiles field. Former Under Secretary of Commerce for Transportation, Robert Murray is now assistant to Baldwin's president. Talbott served as a director of the firm before becoming USAF Secretary.

Subcommittee members emphasized that top government officials should not have connections which permit even the "suspicion" of misconduct—whether or not it exists.

A member of the press, failing to develop evidence on his own, proposed the investigation of Talbott to the subcommittee about three months ago. Routine checks were made by the committee staff. Just prior to Counsel Kennedy's scheduled session with Talbott, newspaper headlines reported that an investigation was underway.

Chairman McClellan promptly labelled the reports as "inaccurate" and "not so as of now—period." He deplored that Talbott had been subjected to widespread unfavorable publicity—before it had been determined that evidence even warranted an investigation. Democratic Sen. Henry Jackson (Wash.) took a similar position.

Avoids Controversy

In view of the subcommittee's scrupulous handling of the case, Talbott likewise refrained from engaging in public controversy. After the session with Kennedy, he issued a formal statement:

"I have had a very pleasant meeting with the counsel for the Senate Investigations Committee this afternoon. He asked for and I have given him all the information he asked for regarding the matter at hand. Further I have volunteered other information to them

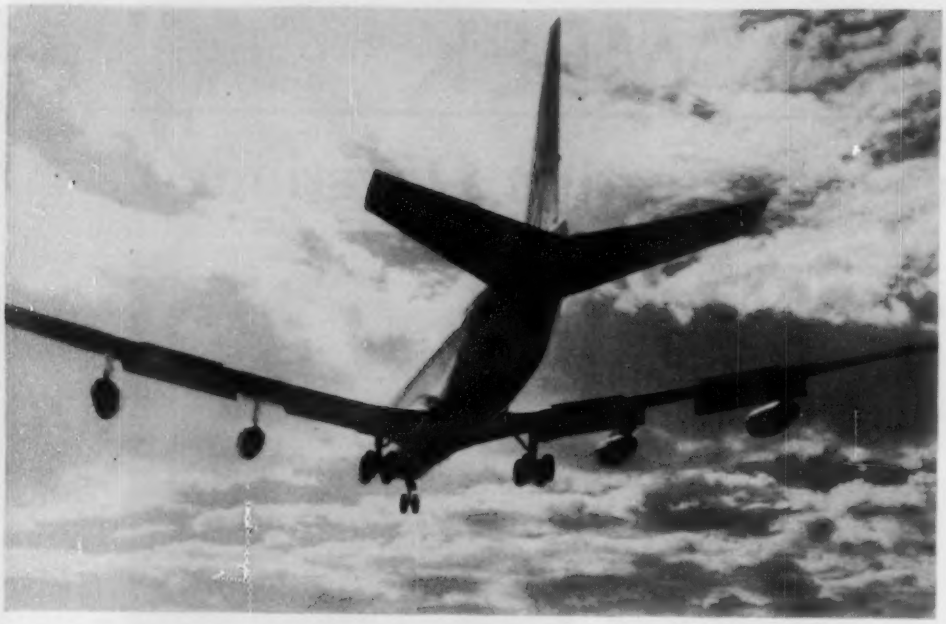
USAF SECRETARY TALBOTT

Company History

This background was furnished Aviation Week by the Paul B. Mulligan and Company.

The firm was formed in 1947 by Paul B. Mulligan to provide "clerical cost control" services, with Harold Talbott as a partner. Mulligan developed his own manual on clerical time standards. The company "recently" expanded into "general management engineering."

At present, the firm has a staff of 17 and has done work for about 50 large corporations. Current active accounts are Oscar Mayer, Electric Auto-Lite, and Libby-Owens-Ford. The only office at present is 405 Lexington Ave., New York City. A Cleveland office was closed two years ago.



707 Shows Unusual Flap-Spoiler System

Boeing Airplane Co.'s 707 reveals its unusual flap-spoiler arrangement in these new photographs of the prototype jet tanker-transport. Saw-tooth spoilers are outlined clearly on wing's edges in the upper photo. The 707 has logged nearly 200 hours in the air since its flight test program started July 15, 1954. With its initial test program completed, the jet transport is being equipped with a new flying boom for aerial refueling trials. It has exceeded speeds of 600 mph. and operated altitudes above 42,000 ft.

so that the committee might have a full understanding of my relationship with the Paul B. Mulligan Company. I have no apology of any sort to offer for any of my business associations. They have been proper and ethical in my opinion. I believe any further statement on this matter should come from Senator McClellan, chairman of the committee."

Following are two excerpts of Talbott's 1953 testimony before the Senate Armed Services Committee, pertinent to a consideration of his relationship with the Mulligan Company. In the first, he acknowledges his connection as a partner. From the second, it might be understood that he is receiving no compensation from this firm, or any other. He was questioned by Sen. Leverett Saltonstall (R.-Mass.), then chairman of the committee.

The first excerpt:

"**Talbott:** I had one other interest. I have an engineering company in which I have dropped back as a special partner.

"**Saltonstall:** Are you still a special partner?

"**Talbott:** I am still a special partner in that company.

"**Saltonstall:** What is the name of that company?

"**Talbott:** Mulligan and Co.

"**Saltonstall:** What business does it do?

"**Talbott:** Industrial engineering, and they confine their work entirely to clerical companies, controls, clerical controls, or the study of the numbers of clerks needed in an industry, and in their clerical work. And it is very successful in its analysis of how many clerks are needed in the operation of a business.

"Now, in setting myself up as a special partner, our lawyers drew up an agreement with the other partner—there are only two partners, Mulligan and myself—that no work was to be done while I am in Washington, that had to do with defense work essentially. They may be doing some work for Ford, for example, but that is not essentially a war contract. But where it is possible, they will stay away from any of the aircraft companies.

"**Saltonstall:** In other words, you have divested yourself of every business interest, or will have divested yourself from every business interest, when you are sworn in as secretary?

"**Talbott:** Yes, sir."

The second excerpt:

"**Saltonstall:** Are you getting a salary or fixed compensation for services of any company now, at all?

"**Talbott:** The only compensation I am getting is my pensions, and the pensions, for instance, of the Electric Auto-Lite, I have paid in over the years a certain amount toward my pension fund.

"Now I can resign from Auto-Lite and my pension starts, in proportion to the amount that I have paid into it, and the company has paid in.

"**Saltonstall:** Well that is for past services?

"**Talbott:** Yes, sir."

This is the law which senators will have to interpret in determining whether Talbott's connection with the Mulligan firm is in conflict with his public office:

"Whoever being an officer, agent, or member of, or directly or indirectly interested in the pecuniary profits or contracts of any corporation, joint stock company, or association, or of any firm or partnership, or other business entity, is employed or acts as an officer or agent of the U. S. for the transaction of business with such business entity, shall be fined not more than $2,000 or imprisoned not more than two years, or both."

Defense Secretary Charles E. Wilson at first balked at divesting himself of substantial holdings with General Motors Corp., arguing that as secretary he would have nothing whatever to do with the negotiation of contracts with GM. However, the Senate Armed

Services Committee held that an indirect "conflict of interest" was involved and insisted on Wilson's divesture of his holdings as a condition of confirmation.

Sharp Is Appointed Successor to Lewis

Dudley C. Sharp, 50-year-old Houston, Tex., Republican, last week was appointed Assistant Secretary of the Air Force for Materiel. He will succeed Roger Lewis who resigned effective Sept. 30.

Sharp is president of the Mission Manufacturing Co., Houston, makers of oil field equipment. He joined the firm in 1927 following his graduation from Princeton University. He served with the U. S. Navy from 1942 to 1945. Observers speculated that Sharp was recommended for the post by his fellow Texan, Robert Anderson, who recently resigned as Deputy Secretary of Defense.

Lewis told President Eisenhower in his letter of resignation: "Pressing personal considerations compel me to tender my resignation as Assistant Secretary of the Air Force. This is a matter of deep regret . . .

"Under your leadership the strength of our Air Force has increased sharply, while its cost to our standard of living has been held to a minimum. I am very proud to have been an active participant in this vital effort.

"You may, of course, always count on me for further service."

President Eisenhower replied: "You have indeed made an important contribution to the sound efficient conduct of the Air Force's vast procurement and production program during a period in which the strength of the Air Force was being greatly increased."

Lewis did not disclose his future plans. He is expected to return to private industry. Before Lewis accepted the government appointment in 1953, he was vice president-sales for Curtiss-Wright Corp.

New White House Plane

First of 15 Aero Commanders ordered by the Air Force will be delivered to President Eisenhower this week. The President has been using an Aero Commander loaned to USAF by Aero Design and Engineering Corps., Bethany, Okla. (AW June 13, p. 7).

Balance of the L-26Bs will be used for VIP travel in the Washington area. Cost of the planes is $1,178,623.

The twin engine aircraft carries seven persons, including the pilot, has a service ceiling of 22,000 ft. and cruises at 220 mph. Range without auxiliary fuel tanks is about 1,100 miles.

Northrop Plans Texas Missile Plant, Rekindling Coast Dispersal Fight

By William Coughlin

Los Angeles—Announcement of Northrop Aircraft's plans for a guided missile plant in Texas touched off new West Coast protests last week against Air Force Secretary Harold E. Talbott's dispersal policy.

"Substantial operations" of the company will be moved to El Paso, "an ideal site since it is situated in the center of the guided missile and pilotless aircraft activities of the Army, Navy and Ordnance Corps," said Whitley C. Collins, president of the company.

Although Northrop said plans for the new production site started back in 1954, members of the Los Angeles Chamber of Commerce believe this is a case of taking business away from the West Coast as a result of Talbott's dispersal directive.

Operations are expected to start the **first of next year** in a 25,000-sq.-ft. pilot plant located on two acres in El Paso. It will be run by Northrop's subsidiary, Radioplane, Inc. Main facility will be constructed on a 640-acre site about 10 miles north of the city. Initially about $1 million will be spent setting up the new operation, Collins said.

Dispersal Survey

"Government fiat has decreed the end of progress in West Coast aircraft industry through refusal to permit us to keep up with developments in the guided missile field," declared Carl P. Miller, president of the chamber.

This was the West Coast picture as the dispersal fight was renewed:

- **Boeing Airplane Co.** was reported negotiating for a site in Denver or Salt Lake City to build its Bomarc missile.
- **Marquardt Aircraft Corp.**, which produces the ramjet powerplant for the Bomarc, was informed by USAF that it could not locate the production facility at its Van Nuys, Calif., plant. Marquardt was looking for an inland site that would place it close to the new Boeing plant.
- **Lockheed Aircraft Corp.**'s work on a guided missile facility planned at Van Nuys still was at a standstill.

Attack on Talbott

In what was probably the bluntest attack to date on the Talbott directive, Miller stated: "The impending Boeing move to either Salt Lake City or Denver, the reported Northrop development in El Paso, and similar moves planned or in process by other firms all point up the working out of the announced policy of the Secretary of the Air Force to stymie the aircraft industry on the Pacific Coast.

"If the Air Force can take the time to build new facilities and a new trained labor force in new areas where neither now exist then perhaps the war threat to the country is not as great as we have been led to believe.

"We on the West Coast believe it is high time to quit gambling with our defense and utilize, through maintenance and expansion, the facilities and knowhow which already exist."

Snark Stays

In making the Northrop announcement, Collins emphasized that Northrop's top-priority program for development of the Snark SM62 will remain unchanged. He said development and manufacture of the Snark will continue at Hawthorne, Calif.

However, he stated that as the 640-acre site north of El Paso is developed, Northrop will move certain of its operations there—this presumably could include Northrop's new Crossbow missile project.

Radioplane will use the pilot plant for engineering, production repair and modification work on drones and missiles. Principal product of Radioplane is the RCAT propeller-driven target drone plane, used by the military for gunnery training. Fort Bliss, near El Paso, is the largest single user of RCAT.

"All information about this plane is secret. You'll have to figure out how to fly it yourself."

18th AF to Get First C-130 Global Airlift Group in 1956

Marietta, Ga.—First group of Lockheed C-130A Hercules turboprop transports for global airlift will be formed in Tactical Air Command's Eighteenth Air Force sometime next year, replacing Fairchild C-119s.

Speed capability of the new transport—roughly double that of existing types—will enable air support to follow on the heels of tactical units into foreign theaters of operation.

In a preview of the C-130's future role in global operations, Lockheed and USAF personnel put three airplanes just off the production line through a series of flight and ground-loading demonstrations.

Flown at maximum landing weight and on its third flight, the third production airplane rocketed off the ground into a steep climb. Lockheed pilot Leo Sullivan brought the plane back across the field low and fast, then hauled up into a steep climbing turn.

In the next pass he turned steeply to circle the field for a slow run at about 100 mph. with cargo doors open. Landing was extremely short, made with full brakes and props in reverse pitch. Sullivan backed the plane along the runway at about 25 mph. to conclude the demonstration.

Ground-loading demonstrations by a USAF team from 1st Aerial Port, 18th AF, Donaldson AFB, S.C., featured:

- **Off-loading an aircraft warning team** of five men and a weapons carrier from one C-130A and supplies and equipment from another.
- **Rapid conversion** of the first aircraft to a passenger configuration, then loaded with 92 men.
- **Loading a 155-mm. howitzer,** biggest weapon used by an Army division. Although successfully done in several rehearsals, the exhibition loading was marred by the failure of a ramp hinge on the plane.
- **Loading a single Nike round** on its launcher and trailer, and simulating the loading of a Martin TM-61 Matador from a flat-bed trailer.
- **Loading of a 5,000-gal. fuel tanker and tractor,** incompleted because of the earlier hinge failure.

Planes featured in the loading demonstration were fourth and fifth production. Second production is a static test airplane. Now on flight status are first and third production, one prototype.

Major difference between production C-130s and prototypes is in the increased takeoff and normal power ratings of the Allison T56 turboprops. Rated at 3,750 eshp. each for takeoff, the production T56 engines have about 500 hp. more per engine than the YT56 engines in the prototype stage.

AA Profits Climb

American Airlines' net profit for the first half of 1955 totaled $8,537,000, increasing sharply from $5,014,000 for the same period last year. Common stock earnings, after preferred dividends, were $1.13 for each outstanding share. In the first six months of 1954, per share earnings were 66 cents.

In his financial report last week, AA president C. R. Smith said control of expenses largely was responsible for the improved earnings. Expenses during the period were held to a 4.5% increase.

Revenues totaled $124,869,000, compared with $111,237,000 for the 1st half of last year.

In traffic, American carried 3,524,000 passengers a total of 2,065 million passenger-miles, an increase of about 15% over the comparable period of 1954; the airline carried 31,418,000 ton-miles of airfreight, a 13.5% gain.

Fairchild Designs New Jet Transport

Fairchild Engine and Airplane Corp. has completed plans for a light jet transport, designated the M-225, specifically designed for executive transport use with a cruising speed of 560 mph.

W. L. Landers, general manager of the Fairchild Aircraft Division, said the plans had been studied by industrial fleet operators and military agencies. "There is a recognized need," he said, "for a light jet transport of this category and those who have seen these designs have expressed considerable interest and enthusiasm for the project." It will also meet military requirements for speedy transport and transitional training use, Fairchild said.

Present plans call for using four Fairchild J44 turbojet engines or another engine of comparable thrust. The J44 develops 1,000 lb. of thrust. Wing span of the aircraft is 35 ft., 4 in., length is 50 ft., 10 in., and height is 13 ft., 3 in., gross weight is 17,695 lb., and the plane will have a range of 1,280 nautical miles with maximum fuel load.

A low wing design, the jet transport will carry a crew of two and seven passengers.

Fairchild said the plane combines high speed performance characteristics of fighter aircraft with the safety characteristics of transport planes.

Performance data shows that the plane will take off at gross weight of 17,695 lb., in 5,720 ft. across a 50 ft. obstacle and land in 1,222 ft.

The plane was developed under Fairchild's research and development program and is one of several projects in the advanced planning stage.

DC-8 Venture Cuts Douglas Net

Los Angeles—Heavy experimental and development costs of Douglas Aircraft Co.'s DC-8 jet transport have cut into the company's current earnings, the firm's financial figures indicated last week.

Douglas statement for the six months ended May 31, 1955 revealed earnings of $3.71 a share, compared to $5.20 a share for the first half of last year. This includes adjustment for the March stock split.

Total earnings for the period were nearly $6 million less than last year's. Development costs for the same period were set at more than $5 million, an increase of more than $3.5 million over the comparable period last year.

In a statement accompanying the financial report, President Donald Douglas said one factor in the drop in earnings was "continuing heavy experimental and development expenditures partly attributable to the forthcoming 550 mph. DC-8 jet airliner."

Published reports have estimated the company will put $60 million to $70 million into the DC-8 before it makes its first flight. Boeing Airplane Co. estimates the cost of the 707 up to first flight at $20 million. Much of this Boeing expense was covered by a tax write-off not available to Douglas due to a change in tax laws. Total development cost of the DC-8 therefore will be above that of the 707 jet tanker transport prototype.

Douglas spokesmen point out, however, that Boeing costs for the company's first commercial jet model will be considerably above the $20 million attributed to the 707.

Offsetting a drop in both earnings and sales for the period was the fact that the current Douglas backlog of 228 airliners of the DC-6 and DC-7 series is the highest in the company's history.

Value of this commercial backlog including parts, is set by the company at $414,276,000.

Total company backlog, including military aircraft and guided missiles, was $1.9-billion.

Berlin Hints Piasecki Unfair Competitor

By Gordon Conley

New York—"Any way you slice it, Frank Piasecki's new company is going to compete with us," said Don R. Berlin, president and board chairman of Piasecki Helicopter Corp. "So we'll have two firms with nearly identical names competing in the same field and, to make it even more confusing, the president of one sitting on the board of the other—listening to plans that should be kept within the family."

Berlin had a solution for one of the problems created when PHC's founder organized Piasecki Aircraft Corp. after management of the older firm forced him out as board chairman. "We'll change our present name," he told a press conference here last week. "There's no other alternative. A special meeting of the board will act on this in the near future."

But there appeared no way to keep Frank Piasecki from being in on all new projects of the Morton, Pa., firm or to block his plans for keeping an active hand in policy making (AW July 18, p. 15). With 20% of PHC stock in personal holdings and control of an additional 5% through associates, Piasecki is in a nearly unshakable position on the helicopter company's board of directors and executive committee.

Rockefeller interests, which purchased 35% of Piasecki Helicopter during late 1946 and moved the Berlin group into management positions, offered to buy out the founder a few months ago. Exploratory talks broke off, and there were no indications that they would be reopened in the foreseeable future.

Remaining 40% of PHC shares are held by approximately 1,580 stockholders, a group that could return control of the firm to Piasecki if he won their unified support. Berlin said he does not see how the copter designer can use the new Piasecki Aircraft as a step in this direction.

Parallel Programs

In Philadelphia, Frank Piasecki said he and his associates want to retain their holdings, not for competitive reasons, but because they believe they contribute to the welfare of the copter company.

"We feel it is important for us to add our knowledge and experience and our philosophies to the growth of Piasecki Helicopter Corp. We by no means feel our interest in that company is insignificant."

He washed his hands of responsibility for competition between the two firms. "I do not control the activities of the board of directors of PHC," Piasecki said. "Therefore, I think that if PHC elected to do anything competitive to PAC, it would not be my decision. We are only three members (including Piasecki Aircraft Directors Donald N. Meyers and James J. Davis) out of an 11-man board."

There was no room for doubt, however, that both companies would bid for the same contracts if each followed through on its announced program. These included:

• **Vertical-lift aircraft.** Both plan to design, develop and build rotary-wing craft and other vertical-takeoff-and-landing types. Berlin now has some VTOLs on the drawing boards and is studying the "entire field of vertical lift." Piasecki is working on about 26 projects, including at least one complete aircraft.

• **Commercial sales.** The two companies want to convert military aircraft to commercial configuration, with emphasis on transport helicopters. Berlin already has put the H-21 Work Horse on the civil market (AW July 4, p. 80) and expects certification of the 19-passenger transport to be completed by Civil Aeronautics Administration in March 1956.

• **Foreign agreements.** Piasecki emphasized plans to license aircraft builders in other countries to produce his products. Berlin said PHC also is interested in this field.

Despite parallel programs, both were optimistic about success. Berlin reported a $130-million backlog of orders on hand June 30, an increase of $30 million since Jan. 1, and said the sales and profit outlook for 1955 is healthy. Piasecki predicted his new company would operate at a profit within six months.

Reopened Wounds

In the exchange last week, long-standing differences between Piasecki and Berlin broke into the open again. Each blamed the other for Piasecki's unsuccessful fight with the helicopter firm's present management.

Piasecki repeated his claim that he broke with PHC because of its preoccupation with military contracts and failure to move into civil and foreign markets. His successor said the breach was caused by gaps in the research and development program.

"Only recently have we smoothed out our troubles with the H-21 enough to look forward to commercial sales or foreign licensing," said Berlin. "It was a matter of timing.

"The difference of opinion started out as a question of organization, particularly in regard to our research and development group. I felt that it should report to the head of our engineering department. Frank didn't.

"We also disagreed on the research and development program. We had nine directors on the board at that time. Eight believed there were gaps in the program and were somewhat critical of it. Frank was the lone member who disagreed.

"In general, the board felt we were not covering the field of vertical lift as thoroughly as we should. We believed there were specific areas the helicopter always would hold but, at the same time, other aircraft with nearly vertical lift could take over other fields."

Period of Confusion

Berlin predicted a temporary period of confusion at the Morton plant but said he expected the situation to smooth out in a short time.

"Piasecki Helicopter is an operating team, not just one person," he told the news conference. "As for new competition, the field is wide open; there's plenty of room in it for another company.

"It's extremely unfortunate that the company's founder found it necessary to leave. Because of this, we're now in a period of readjustment and temporary confusion.

"I personally believe it would have been to Frank's long-term advantage to stay with the company. With a little give and take, the situation could have been ironed out."

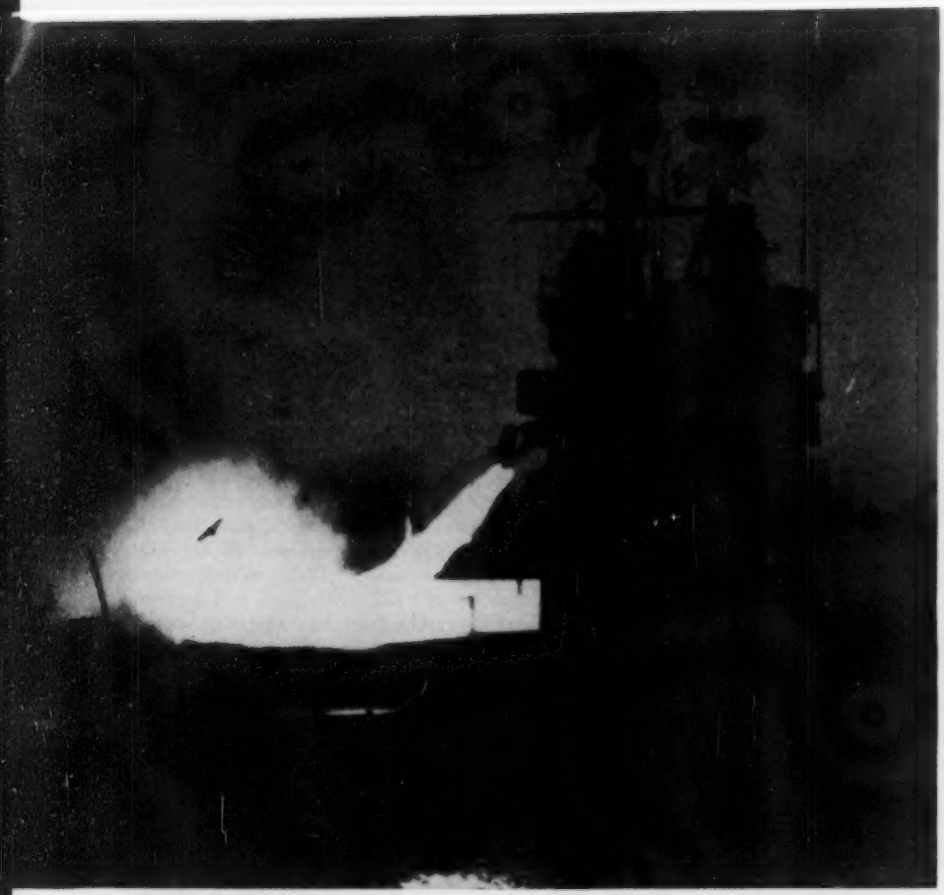
First YH-16A Flight

The YH-16A Transporter, powered by twin Allison T38 turbine engines, made its first flight last week at Piasecki Helicopter Corp.'s Morton, Pa., plant.

Meanwhile, modifications were started on the first YH-16 that will include replacing its Pratt & Whitney Aircraft R2180 piston engines with more powerful Allison T56 turbines as predicted by Aviation Week (No. 8, 1954, p. 8). This aircraft will be the production prototype for Piasecki Helicopter's turbine-powered H-16s.

A commercial version of the large twin-rotor copter transport would carry at least 40 passengers.

"This is a prototype of the next really important line of helicopters," Don R. Berlin, Piasecki board chairman and president said last week. "It will be in the same field with the Convair 240 and Martin 4-0-4."



CONVAIR TERRIER back blast lights up USS Mississippi during night firing tests.

Supersonic Terrier

WARHEAD of Convair Terrier anti-aircraft guided missile explodes close to P4Y-2K drone, showering target with shrapnel . . .

Airlift Closes Asia Troop Gap

By Claude Witze

Tokyo—U. S. armed forces in the Far East are using an expanded airlift to hold the line against the Communist threat with fewer combat units.

USAF is operating a scheduled and non-scheduled transport service covering an area as large as the United States, delivering 265,000 items to scattered military bases.

One of the two operating units of the 315th Air Division, the 483rd Troop Carrier Wing, reports that 60% of its airlift capability is used by the Army.

Mobility Vital

With the end of the war in Korea, which started the big demand for air transportation, there has been a change in the type of cargo but the planes are working just as hard today.

The ground units remaining must be more mobile to meet the menace of brush fire wars in the theater. For this reason, constant mobility exercises are included in the program.

Army's 508th Regimental Combat Team, which just replaced the 187th in Operation Gyroscope (AW July 18, p. 13) soon will start airborne exercises to keep soldiers and air crews ready for action.

Col. Jamie Gough, commander of the 483rd provides the Fairchild C-119s for these operations, in addition to running seven daily scheduled flights to bases in northern Japan and south to Formosa with C-47 and C-54 transports. There are around-the-clock special flights to meet the demand for shifts in personnel and cargo.

The 315th Air Division's capability for the theater is measured in terms of flying time—333 hrs. a day for all available aircraft—C-119s, C-47s, C-46s, C-54s and C-124s. Lift available: 721 tons a day. All of it is used.

CAT Role

Other highlights of the airlift program in the Far East:

• **FEAF is aided** by Military Air Transport Service, particularly on long hauls and into the Formosa area, where the 315th hauls nothing but rations.

• **A commercial air line,** Civil Air Transport, has a contract costing $2,500,000 a year to supplement the military effort with commercial C-46s. They get $263 an hour for their flight time.

• **CAT also meets emergencies.** When the C-119 was grounded for propeller changes earlier this year, the air line rounded up pilots and crews, supplied an extra 1,900 hours of flight time.

• **FEAF,** in addition to training Japanese pilots for the defense of their own country, is checking them out in the C-46 and shifting aircraft to them. By the first of next year the Japanese pilots are expected to have their own squadron of the transports. The Japanese have 36 C-46s.

• **Flexibility is stressed,** particularly by the 483rd, and Col. Gough says the C-119 has special virtues in this regard.

It is the only plane in his stable

Commercial Overhauls

USAF policy of favoring some spread of service contracts to commercial firms has been extended to the Far East Air Force with these results:

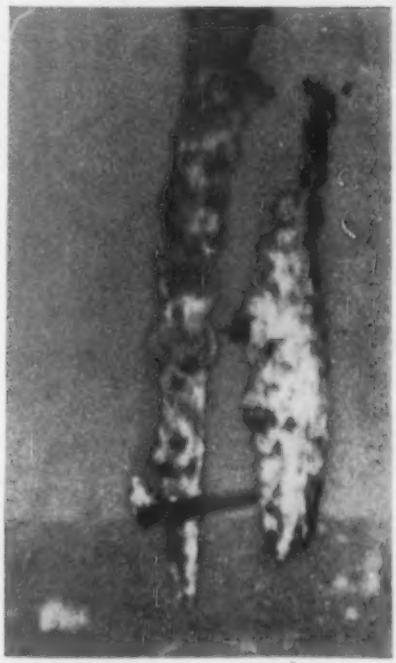
• Civil Air Transport does IRAN (inspect and repair as necessary) overhauls on C-46, C-54 and C-119 aircraft in Formosa. According to the 315th Air Division, CAT's IRAN job is the most complete and efficient given to USAF planes anywhere in the world.

• Japanese firms can do IRAN overhauls at a cost averaging not more than 85 cents an hour. Cost in the United States is $5 an hour.

Downs Drones in Navy's Anti-Aircraft Test Exercises

A MOMENT later, fire streams from the engines. U. S. Navy is equipping its first two missile cruisers with Terriers.

SHATTERED by blast of the supersonic weapon, developed by Convair under direction of Johns Hopkins University . . .



DRONE disintegrates in flames. Marines also will adopt the rocket powered missile for anti-aircraft defense in landing operations.

that can perform all missions.

• **FEAF has one radar station** in Korea that is located on a nearly-inaccessible mountain top. All water and fuel is supplied by air drop. In the winter there is no other means of supply. A total of 98% of the drops fall accurately into a zone 200 yards square. Twenty 500 lb. bundles can be dropped in 14 seconds.

Construction Work

All USAF bases in Japan show evidence of the importance of airlift capability to our military strength. The transport planes and cargo terminals make the fields major points for transfer of everything from overhauled engines to perishable foods.

Base construction work will include improvements to facilitate the job. In some cases, this will include the strengthening and lengthening of runways. Takeoff of the C-124s, moving the 187th back to the U. S. was held from Itazuke Air Base, the only one in southwest Japan large enough for the heavily-loaded Globemaster.

More construction is under way at this base, closest to the part of China where the Reds have been concentrating airpower as a threat to Formosa. When the runways are longer and heavier they will be suitable for other modern planes, such as the B-52.

DAYTIME FIRING of Terrier is only a little less spectacular than night launching.

C-121C Tests Begin

Burbank, Calif.—First C-121C came off the Lockheed Aircraft Corp. production line last week and now is in flight test.

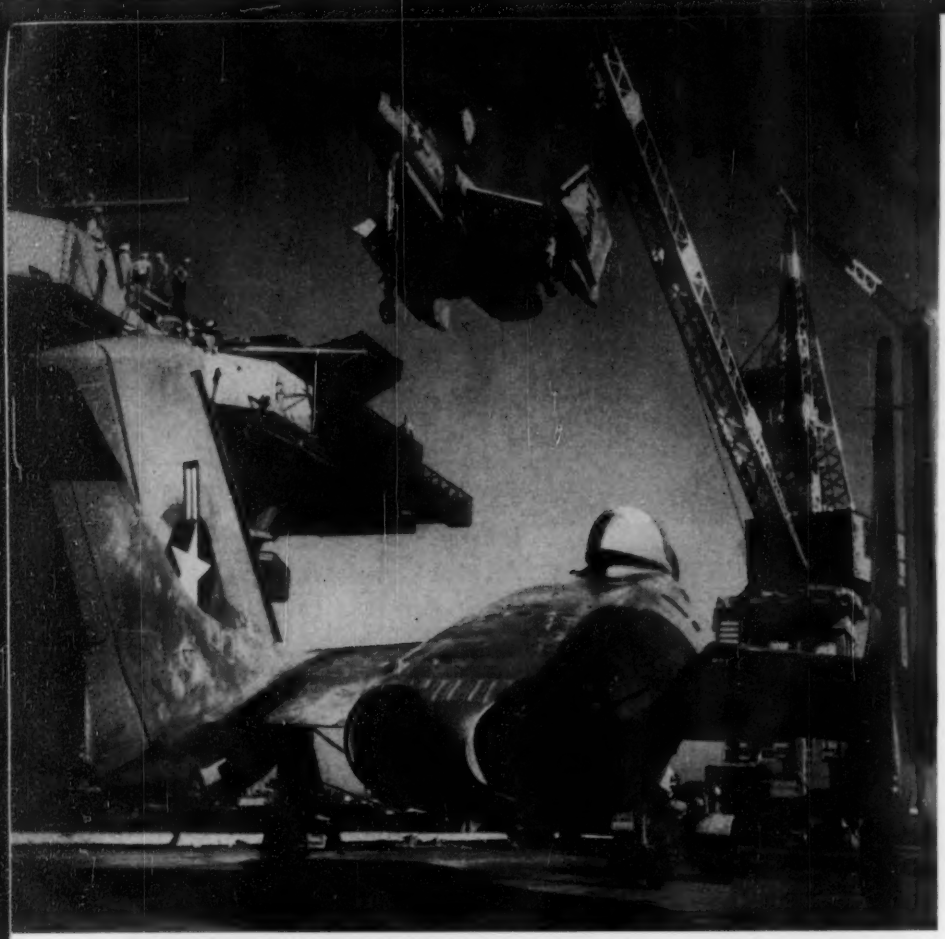
Size of the order for the plane, similar to the 1049G except for the interior, was not disclosed but Lockheed said it "represents the largest single order of Super Constellations ever placed."

The aircraft is designed for use as a personnel, cargo or hospital plane.

Deliveries will begin in late summer to the trans-Atlantic Division of the Military Air Transport Service.

At maximum cruise power the C-121C flies at 335 mph. and has a range of more than 4,400 mi. Configurations are arranged to accommodate 75 passengers or 47 litter patients plus hospital attendants or more than 14 tons of bulk cargo.

Special magnesium extrusions are used for a new-type flooring in the main cabin area which will withstand a load of 300 lb. per sq. ft. or 1,000 lb. per lin. ft.



FIRST SEA DUTY ASSIGNMENT for Chance Vought F7U-3 Cutlass Squadron VF-124 will take the twin-jet Navy fighters to the Far East this month on the U. S. S. Hancock. Here F7U-3s are being loaded aboard the Navy aircraft carrier at San Diego, Calif.

Hiring of Retired Officers Aired

The practice of "a goodly percentage of the 100 principle firms doing business with the Department of Defense" employing former top-ranking military officers was questioned last week by Rep. Robert Mollohan (D.-W. Va.).

He submitted to the House a list, not "by any means complete," which included a large percentage of former Air Force officers now serving with aviation firms. Observing that "in every instance these high-ranking officers serve their firms in such capacities as chairman of the board, director, or vice president," Mollohan added:

"I do not wish to reflect in any way upon the high qualifications and undoubted integrity of these retired officers who have so ably served their country with honor and distinction.

"Nevertheless, I find it a too startling coincidence that so many of the corporations employing them could not find qualified civilian personnel within their own organizations, or in industry generally, to fill their positions. Instead, these companies have resorted to the employment of men whose professional careers have, for the most part, been spent almost exclusively in one branch or other of the armed forces."

Mollohan's chief point of concern is the mounting influence of the military over civilian affairs since the end of World War II: "In government, in business, in industry, and in the scientific fields, the military seemingly trespasses more and more upon those preserves which the American people have constitutionally and historically reserved for the exercise of civilian authority and control.

"Surely, the time has come when we must ask ourselves: Is this the way we want it to be?"

Pointing out that law prohibits retired military officers from serving as sales representatives to the service in which they formerly served, Mollohan raised this question: "But how can we differentiate between actual direct sales and the sometimes even more effective indirect selling?"

The following 16 retired officers were included in Mollohan's listing of 33 effective as of Dec. 31, 1954:

Gen. Omar Bradley, U.S.A.; chairman, Bulova Research and Development Laboratories, Inc.

Lt. Gen. Levin Campbell, Jr., U.S.A.; director, Curtiss-Wright Corp.

Gen. Lucius D. Clay, U.S.A.; director, General Motors Corp.

Gen. Jacob Devers, U.S.A.; technical adviser to the president, Fairchild Engine & Airplane Corp.

Gen. Ira Eaker, U.S.A.; vice president, Hughes Aircraft Co.

Lt. Gen. Harold George, USAF; vice president and general manager, Hughes Aircraft Co.; vice president, Hughes Tool Co.

Lt. Gen. William Hoffman, USAF; vice president, Grumman Aircraft Engineering Corp.

Maj. Gen. Frederick Hopkins, USAF; vice president and director, Cleveland Pneumatic Tool Co.

Gen. Joseph McNarney, USAF; president, Convair Division, General Dynamics Corp.

Col. Martin Daniel, U.S.A.; vice president, Hughes Tool Co.

Maj. Gen. Edward Power, USAF; vice president, Curtiss-Wright Corp.

Lt. Gen. Elwood Quesada, USAF; vice president, Lockheed Aircraft Co.

Adm. De Witt Ramsey, USN; president, Aircraft Industries Assn.

Brig. Gen. Martin Scanlon, USAF; vice president, Republic Aviation Corp.

Adm. John Towers, USN; special assistant to the president, Pan American World Airways.

Gen. Benjamin Chidlaw, USAF; consultant, Thompson Products, Inc.

Renegotiation Act Extended 2 Years

Congress has completed action on legislation extending the renegotiation law two years—to Dec. 31, 1956.

It is retroactive to Dec. 31, 1954, the date on which the last renegotiation extension law expired. All defense business in excess of $5 million is subject to review by the Renegotiation Board.

The legislation also directs a study by the Joint Congressional Committee on Internal Revenue Taxation to determine whether there is any necessity of extending renegotiation beyond 1956 and, if so, the extent to which it should apply. The committee is to report its findings by May 31, 1956.

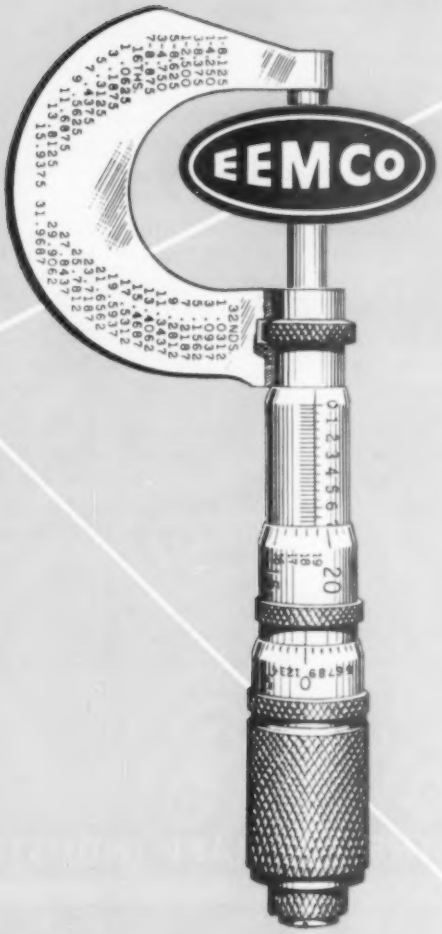
New Jet Fuel for Supersonic Planes

A new jet fuel for supersonic aircraft has been developed by Socony Mobil Research and Development Laboratories using a "hydrocracking" process which reportedly gives the fuel chemical stability for relatively long periods in the 400-500F range.

Fuel stability permits it to act as a better cooling agent without decomposing to give the gums and sediments which tend to plug engine filters and nozzles. With the use of a new Socony Mobil additive, hydrocracked fuels can be further improved to "far greater stability" than is expected to be required for supersonic aircraft, says the company.

Similar to jet fuel classified by the Air Force as JP-5, the new Socony Mobil product is being prepared in small quantities on a pilot plant scale for delivery to the military for evaluation tests.

Since 1942



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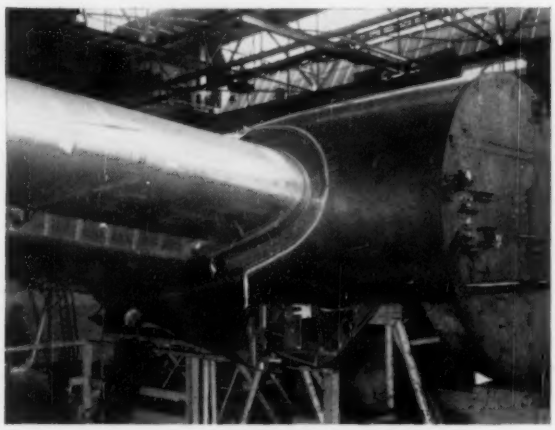
HOW DOUGLAS ADDS ONE MORE PASSENGER AND HIS LUGGAGE...

WITHOUT INCREASING WEIGHT

On the new DC-7 superliner, built by Douglas Aircraft Company, Inc., Titanium is substituted for other metals normally used in nacelle construction. The result is a weight saving, per airplane, equivalent to one passenger and his luggage. And with no sacrifice in strength or safety.

In fact, the strength of Titanium is equal to or greater than alloy steel—yet it weighs only 56 per cent as much.

Douglas uses Titanium sheet for firewalls, structural covering of nacelles aft of firewalls, some frames and the landing gear doors. And if you are interested in facts and figures, here's what they have accomplished with Titanium.



(1) On each of the outboard nacelles of the DC-7, an area of 11,800 square inches of Titanium weighs only 64 pounds, compared to the 68-pound weight of the 8,000 square inches of another metal used in comparable nacelles of the DC-6B.

(2) Each inboard nacelle has 9,300 square inches of Titanium, weighing 55 pounds. On the DC-6B, only 7,600 square inches of another material weighs 64 pounds.

(3) Each set of landing gear doors utilizes 2,000 square inches of Titanium with no increase in weight compared to 1,700 square inches of another metal used on the DC-6B.

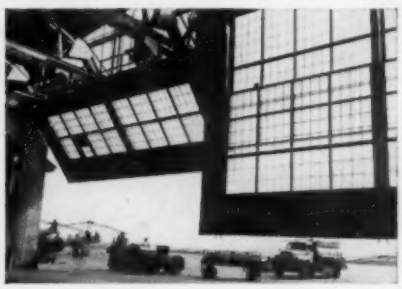
(4) A gage for gage substitution of Titanium for another metal in the 11,500 square inches of the four firewalls saves approximately 42 pounds.

Republic is an old hand at this high strength-to-weight business. Over 25 years ago we pioneered the use of alloy steels—then stainless steels—followed by high-strength steels. Now comes Republic Titanium and Titanium Alloys. We offer you years of experience gained through helping hundreds of manufacturers design and re-design their products to get more strength with less weight. And because we make the world's widest range of steels and steel products, we can also offer you recommendations on metals without prejudice.

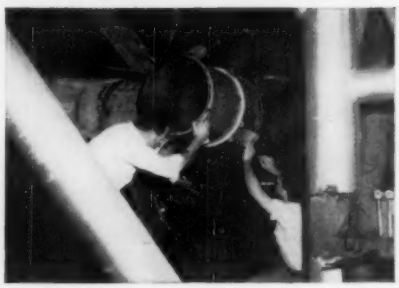
Mail the coupon for informative literature on how Republic Titanium and Titanium Alloys may be applied to your product.

OTHER REPUBLIC PRODUCTS FOR THE AIRCRAFT INDUSTRY

VISION-VENT WALLS, like this one installed in United Airlines Building, Midway Airport, Chicago, Ill., are made by Republic's Truscon Division. Vision-Vent incorporates all the mass production and installation economies of standard steel windows. Insulated panels may be colored porcelain enamel or stainless steel. Many new applications provide simplicity of design, weather resistance, low initial cost, low maintenance cost.



HANGAR DOORS to fit every need, every size opening. All are products of nearly 30 years' specialized experience by Truscon in big-door design and construction. The Vertical Lift Canopy Doors shown above feature a smooth flowing operation, rapid closure for heat conservation. Entire operating mechanism is concealed on the inside of the hangar. Truscon engineers will help you plan the most suitable installation.



ENDURO STAINLESS STEEL is the aircraft metal of many uses. Above, it is used for a jet tail pipe to resist heat. Because of its extremely high strength-to-weight ratio, you can use ENDURO in thinner, lighter sections. It resists temperature extremes, holding its strength, toughness, shock-resistance and corrosion-resistance all the way from blistering heat through sub-zero cold. Republic produces ENDURO in all commercial forms.

(Photo courtesy United Air Lines)

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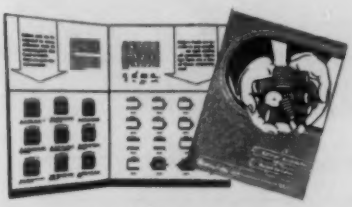

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This 32 page catalog covers basic bellows engineering, conversion tables, metals available and other bellows data. Use the handy coupon for your free copy.

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Self-policing Security Program Sought for Aerial Photographers

A program of self-policing by the aerial photograph industry to protect security information was explored at a joint meeting of industry representatives and members of a government interdepartmental task force on aerial photography.

Ralph Moyer, director of the Agriculture Department's Aerial Photographic Division, presided at the joint session which was opened by R. Karl Honaman, Deputy Assistant Secretary of Defense for Public Affairs, and Robert A. Bowman, Jr., Commerce Department, Assistant Director, Office of Strategic Information. Air Force representatives briefed the group on the strategic importance of aerial photography.

At the closed session, it was agreed that a working system must be established to prevent the delivery of classified photographs to unauthorized persons and Soviet-dominated countries.

The aerial photographers insisted however, that such a system should not interfere with the regular flow of their work.

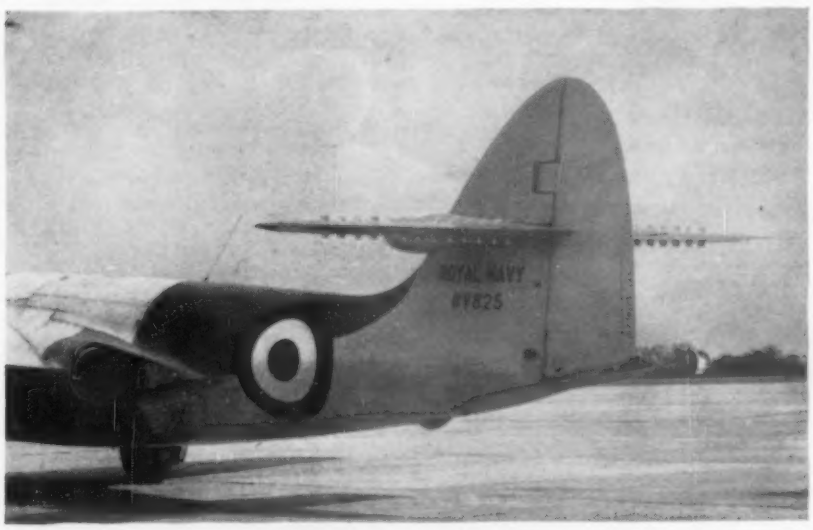
They suggested creation of a central agency that would review and clear job requests, sale of reprints, and maintain a list of strategic areas for which permission would be required before any work could be done.

The idea of industry self-policing was reached by the task force on aerial photography after it was determined a licensing system would not be feasible. A licensing system to govern taking aerial photographs for sale was rejected for three reasons:

- **New Federal legislation** would be required. There is no existing legal authority which would authorize CAA to establish a system for licensing aircraft operators engaged in taking aerial photographs for commercial purposes.
- **Even if covering** federal legislation were enacted the Civil Aeronautics Administration would have a serious enforcement problem and there would be non-commercial aerial photographers exempt from the system.
- **The President** can, by executive order, define certain vital military and naval installations and equipment and prohibit their being photographed.

As a first step in the educational program it was proposed to issue a stamp to put on aerial photographs and mosaics of possible strategic areas. Such a stamp would carry the following wording: "This photograph may contain information of strategic value to a potential enemy. Balanced judgment should be used in its publication and release."

Other protective measures may be developed in the future with additional joint government-industry meetings.



Sea Hawk Vortices

Vortex generators have been fitted to the horizontal tail of this Hawker Sea Hawk, standard carrier-based fighter for the Royal Navy. The company says the installation is to test longitudinal stability characteristics at high Mach numbers. Vortex generators are used to re-energize the boundary layer by creating a series of vortices alternately of left-hand and right-hand rotation. They are generally located to prevent flow breakaway in areas where that may happen.

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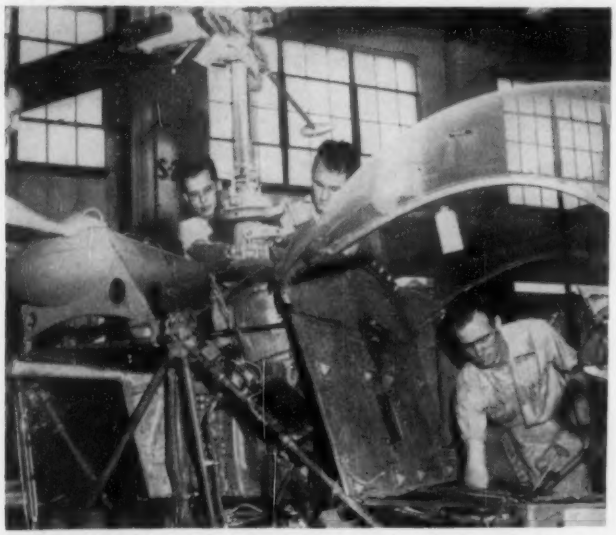
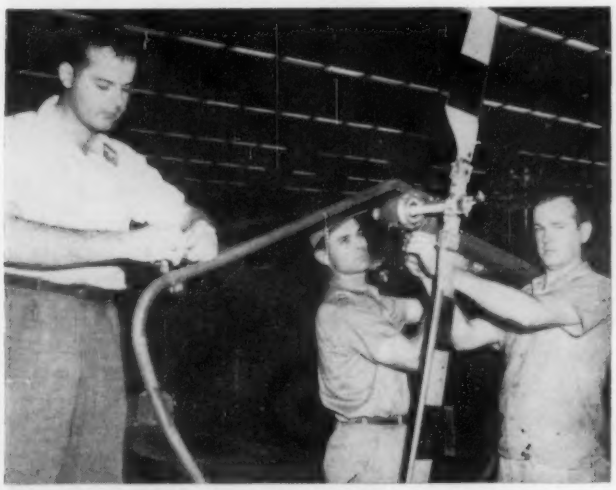
FREIGHTED FIVE: War-weary Bell helicopters, delivered to the military as long as seven years ago, return home for rework.



DISASSEMBLING Bell helicopter is tackled by four-man team, following complete inspection and ground run on receipt.



NEW TAIL BOOM is part of rebuilding job for seven-year old copter, replaces old fabric-covered assembly badly worn.

Bell Repairs Copters

Bell H-13B No. 8874, second of the series manufactured, came back to Ft. Worth on a flatcar after seven years of operational duty with the Air Force as a trainer.

Part of a batch of five tired copters returned to the manufacturer for rehabilitation, No. 8874 was checked out in a brief ground run, inspected and torn down. While this was happening Bell inspectors kept close watch for faults.

Bell technicians listed everything caught during the teardown from a rusted transmission to torn fabric on the tail boom.

The tank was drained, the 178-hp. engine pickled and the gas tank purged.

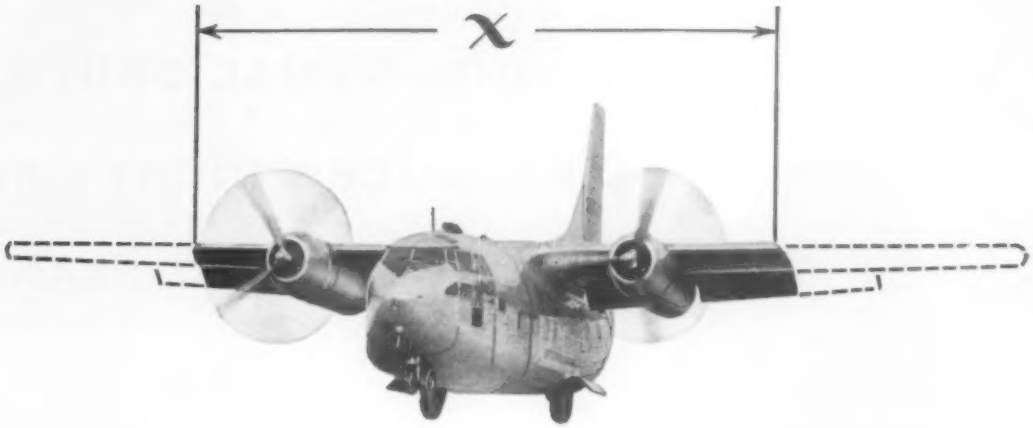
Air Force civilian representative made the decision on replacing, repairing and reusing parts. Bell's shop took over and made all of the many necessary modifications.

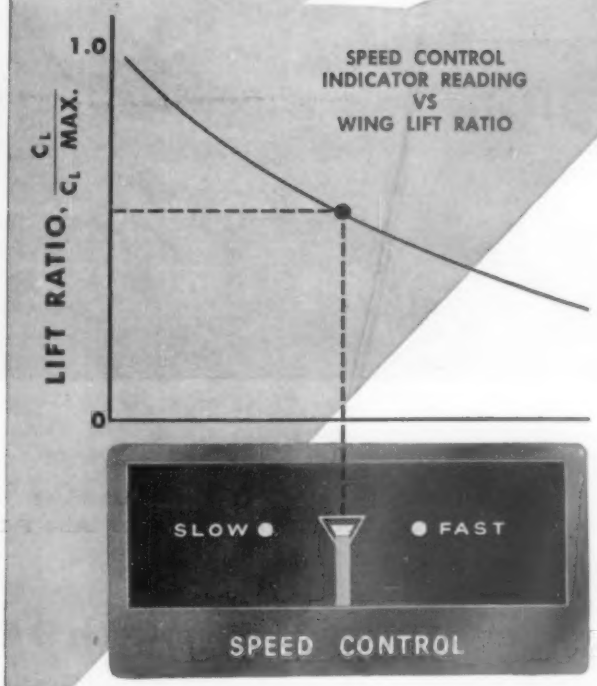
Modernization included installation of a 200-hp. engine, addition of a skid landing gear replacing the old wheel type, a new gravity feed fuel system, and replacement of the fabric-covered tail boom with the more modern open tail boom.

Five weeks from receipt, Bell H-13B No. 8874 was good as new.

TIRED AND FRESH: Two copters contrast the "as-received" model (left) with the rehabilitated craft (right).

How much* of the available WING LIFT are YOU using?





Statistics show that less than one half of the available wing lift is being used for the average landing.

The Safe Flight Speed Control System enables you to utilize safely the full wing lift by zeroing-in a perfectly controlled minimum speed landing every time. Very significant advantages are achieved for both jet and propeller driven type aircraft. The Speed Control System presents lag-free rate and trend information which is easy to follow for precise elevator and power control. It automatically compensates for every configuration, weight, and power condition. Approaches, regardless of turbulence or weather conditions, are made precisely, more safely, and with less effort. This system also insures best take-off climb performance.

The Safe Flight Speed Control System is now standard equipment on all Fairchild C 123B aircraft.

**Unused wing lift means longer runway requirements, lower payloads, excessive brake and tire wear, and possibility of overshoots.*

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Look to Lockheed for Leadership

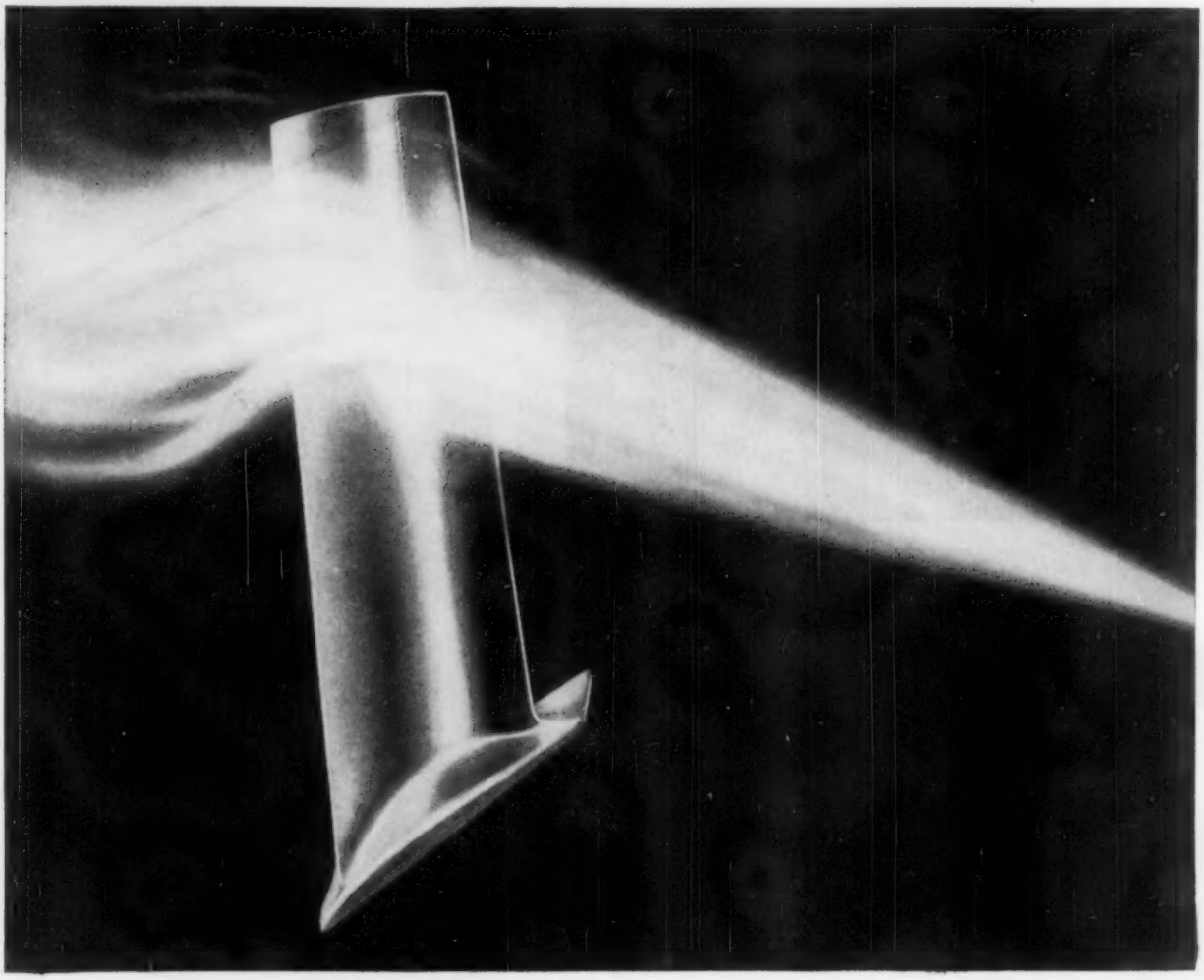
This is the C-130 Hercules, a new Air Force combat cargo plane now in production at Government Aircraft Plant No. 6 (GAP-6) in Marietta, Georgia.

You're going to hear a lot about this plane. The Hercules was designed to function in the new atomic era as a highly mobile, high-speed transport, able to rush men and materiel to vital areas *at less cost*.

The C-130 is the result of a new Air Force-Lockheed concept of tactical mobility. It was engineered specifically to solve problems of loading, unloading, on-board handling, airport limitations and operating costs.

The low fuselage floor, 41 inches off the ground, provides truck-bed loading, while the adjustable tail ramp also permits vehicles to drive directly aboard. And the unique landing gear, combined with the C-130's tremendous power, makes possible short takeoffs and landings even on improvised runways.

Developed for the Tactical Air Command, the Hercules will also drop paratroops and evacuate wounded from forward areas. And its amazingly low operating cost promises greater economy in future peacetime air freight.



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Vacuum Metals Corporation, pioneer in the development and production of vacuum-melted and cast alloys is producing these unique metals for a wide variety of aircraft applications. For help with metals problems that vacuum-melted alloys may solve, please write, giving as much detail as possible, to *Vacuum Metals Corporation, P. O. Box 977, Syracuse 1, New York.*

VMC

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LETTERS

Models & the McCoy

Reading your July 5, 1955 issue, I came across the letter by Mr. Charles Tracy on the sad condition that exists between model aviation and the real McCoy. This is something that I have been preaching for years.

The Plymouth Division of the Chrysler Corp. sponsored model airplane activity for seven years all over the country and then two years ago without warning they suddenly stopped. This, as you can imagine left a gaping hole in model activities.

The Exchange Clubs throughout the country have stepped in and done a fine job but it seems there just aren't enough Exchange Clubs or they aren't in the places they are needed.

In our area our small local club picked up the ball when Plymouth dropped it and in our opinion and many of the modelers we have done a fine job. We gave trophies last year at our 2nd Annual U-Control Olympics which were second to none in the country, said trophies valued at approximately $3,000. This year we are going to hold our meet on Sept. 11 and we are having a time getting the sponsors for the many trophies and awards we want to give. Of the money mentioned above, about 90% came from our town and in most cases the money was donated by business people not even connected with aviation.

I wonder if you could send me copies of this column which we could use to help persuade some of the aircraft companies to help us with our project. Also I wonder if this letter reflects the Editor's opinion in this matter.

Our meet is sanctioned by The Academy of Model Aeronautics as a Triple A meet, which means it is a regional meet. There are only four AAA meets in the East. Ours is way up on the list for the best after only two short years. Would the Editor be firm enough in his convictions to have AVIATION WEEK sponsor a trophy?

I think you might do well to include a section in AVIATION WEEK on Modeling.

F. G. STROH III
AMA 10838
Contest Director
The Glen Burnie Balsa Butchers
18 Drumpoint Rd.
Glen Burnie, Md.

Surplus Engineers

I received your letter today telling me that my subscription is about exhausted. This year I want to let the subscription expire without renewal, as I am no longer associated with the aviation industry, and can better use the price for other purposes.

This is not without regret, as I have enjoyed the magazine very much. I especially admire your courageous and outspoken editorials and articles on the subject of censorship, oversecurity, and secrecy bungling. Also, your letter forum has done much to expose the myth of engineering shortage.

I am a licensed electrical engineer with six years experience in aircraft—from the

Bendix-Skinner
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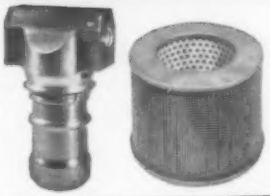
FOR EVERY PLANE AND PURPOSE



Hydraulic Complete filters, or elements only. Up to 14,000 p.s.i. burst, to 120 g.p.m., and filtration down to ½ micron*. Efficiency to 99.9%. (MS28720-4, -6, -8, -12; AN6235-1A, -2A, -3A, -4A; AN6236-1, -2, -3, etc.)

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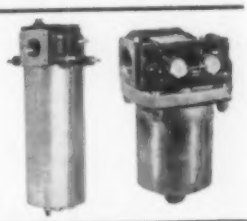
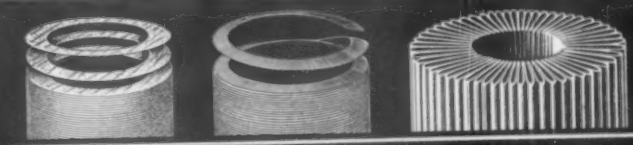


Air Instrument air and breather filter application to 10 c.f.m. Filtration for air-driven instruments and venting of hydraulic systems. (AN6240-1, AN5822-1, AN-6237-1, etc.)

*1 MICRON = .000039"



Disc-type Ribbon-type Pleated-type

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Please write giving complete details and we will answer immediately.

Mr. Ned DeWitt, *Personnel Department* **17**
Rohr Aircraft Corporation
Chula Vista, California

9 miles south of San Diego on sunny San Diego Bay.

ground up. In the past I have been a project engineer on electronics design, in complete charge of a development project, doing most of the design myself (this was not in aviation).

When I left the aircraft game, I was holding down a desk job with great authority, but no method of enforcing it, at $6,140. This job was about 92% clerical work and about 8% low level general engiing. I quit to take a long vacation and then a year of graduate study, after which I may well join the hordes of surplus engineers selling pencils on the street corner or fixing TVs.

R. K. Dickey
2433 Byron St.
Berkeley 2, Calif.

No Tipsy Travelers

Have just read Mr. D. B. Scully's letter in your July 4 issue ("Airplanes & Alcohol," (p. 46).

Would like to comment on two things.

Number 1: After travel on domestic and international airlines that serve alcoholic beverages to amuse the passengers, I can safely say there is never enough served any one passenger to cause him to become intoxicated, assuming that he is of age which permits him to indulge.

Number 2: I am heartily in favor of his suggestion of changing the costumes of the stewardesses and I feel that the 93% of the passengers, which are the male passengers, would be glad to go along with the change.

I might add that if he wishes to make the stewardesses a little more interesting, I might suggest the costume as shown in an ad directly under his name, entitled "Curious? Moodbeam #7."

John Baker
Baker Aircraft Sales
P. O. Box 8066
Long Beach, Calif.

Boeing DC-8?

On page 14 of the June 13, 1955 issue of Aviation Week your writer made the amazing statement that "the DC-8 will continue the Douglas look familiar throughout the DC series. Although jet-propelled, it will be easy to recognize the new airliner as a Douglas product."

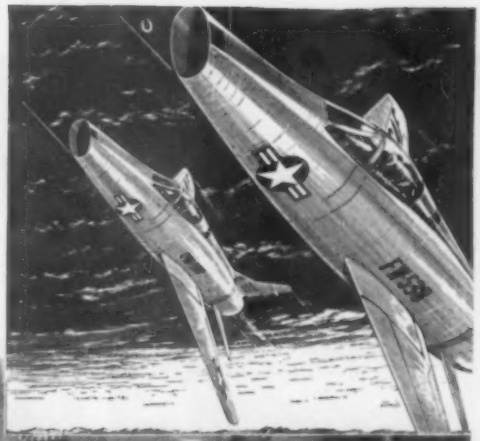
Who is he kidding? One needs only to look at the DC-8 picture on the preceding page of the same issue to see that whatever slight resemblance (fuselage nose, perhaps?) the airplane may have to previous Douglas airplanes is completely overshadowed by the airplane's almost exact similarity in external appearance with the Boeing 707 jet tanker-transport prototype.

In fact, I venture to say that if the airplane in the afore-mentioned picture had not been labeled "Douglas," and the picture itself so captioned, the picture would have been passed over by your readers as simply another picture of the Boeing 707, which has been flying since July 15, 1954. The likeness is that close.

"Let's give the credit for pioneering the "new look" in transport aircraft where it belongs—to the Boeing Airplane Co.

Ed Stickel
1328 South 268 St.
Kent, Wash.

Fast Filter Changes on the F-100 with Marman V-Band Coupling and Aeroquip Hose Lines



Here is an excellent example of how Marman clamps and Aeroquip hose lines work hand in hand to simplify aircraft plumbing installations:

On the North American F-100, a compact Marman stainless steel V-band coupling joins the fuel supply line to the filter. Utmost simplicity is achieved because *the clamp flange has been machined right on the Aeroquip special hose fitting!* The Marman "quick-coupler" latch adds quick assembly and disassembly advantages, and locks securely.

Marman clamps, straps, and couplings are used throughout the F-100 and many other planes for a wide variety of applications. Engineering assistance is available. Write for information.

MARMAN PRODUCTS COMPANY, INC.

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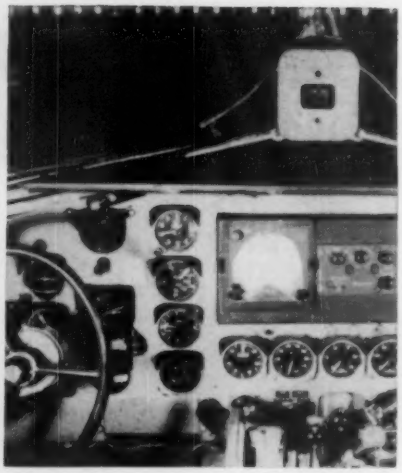


TYPICAL SCOPE INSTALLATIONS—Bendix in Columbia Gas Lodestar; RCA in United Convair 340; Bendix in Cornell-Dubilier DC-3.

Airborne Radar Boom Gathering Speed

By George L. Christian

The airborne radar market has suddenly burst wide open, after a long painstaking test period with experimental equipment.

An exclusive AVIATION WEEK survey shows that, where one year ago not a single executive airplane was radar-equipped, today at least 18 are using radar or having it installed, and the list is growing rapidly.

A year ago, only a few airliners were flying with test installations; today airline orders for radar have reached 400 sets.

The future growth of both markets holds enormous potential.

Satisfied Users

This latest avionic aid to safety and navigation is doing a prodigious job of spotting thunderstorms and terrain mapping for the executive plane pilots who are now using it.

Several airlines have purchased either the Bendix X-band RDR-1 or Radio Corporation of America's C-band AVQ-10 equipment for fleet-wide installation or are evaluating it.

The latest carrier to try out airborne radar is Northwest Airlines, which has installed Bendix X-band in the nose of one of its Stratocruisers. First reports from NWA pilots show unqualified enthusiasm for the equipment. Bendix has also sold X-band sets to Panagra and National Airlines.

Panagra will be the first to put airborne radar into regular, fleet-wide, scheduled operation when it inaugurates DC-7B service between Miami and Buenos Aires Aug. 1. This follows successful test of the equipment aboard one of Panagra's DC-6Bs. The Bendix sets are now installed on the carrier's entire fleet of five DC-7Bs.

National is putting RDR-1 X-band equipment on its entire fleet (excluding a few Lodestars).

Braniff International Airways has been testing an X-band radar (APS-42) for over a year on its international run to South America. Although no decision has been announced, it appears probable that Braniff will join the ranks of X-band users.

RCA has also made deep inroads in the airline market. Among its customers, United Air Lines has just completed the first C-band installation in its executive Convair 340. UAL will spend $4 million on its radar program —$2½ million for the equipment, $1½ million for installation.

Also buying RCA weather radar are Pan American World Airways, American Airlines, Trans World Airlines and Continental Air Lines.

Other airborne radar manufacturers are Collins Radio, coming up with a C-band set; and E. K. Cole, a British firm, which has been making X-band equipment for several years (AW Aug. 14, 1950). Bendix makes C-band, as well as X-band radar.

Storm Spotter

Enthusiastic corporate aircraft pilots have reported to AVIATION WEEK their experiences with the new storm-spotting equipment.

Chuck Woodward, pilot of a DC-3 owned by Cornell-Dubilier Electric Co., recently was flying through heavy thunderstorms near Tampa, Fla. He intercepted a radio message from an Air Force B-47 jet bomber pilot, flying at 35,000 ft., saying that he needed "to go somewhere to get out of this severe turbulence." Woodward, mentioning his radar, suggested to the B-47 pilot that he take an east-bound heading for a few minutes to get into smoother air. Soon the B-47 gratefully acknowledged the correctness of the advice.

In the same storm, Woodward heard the pilot of a pressurized, four-engine airliner in the same area advise Air Traffic Control that he was in severe turbulence, had slowed to 150 knots, but the buffeting was so bad he was requesting a lower altitude. Again Woodward suggested an easterly heading. Five minutes later, the airliner radioed back: "Thanks a lot—smooth here, back up to normal cruise speed."

On another flight, from Richmond, Va., to Raleigh, N. C., Woodward found thunderheads "strung right down the center of the airway." Using his radar to guide him, he moved over five miles and "missed the whole works."

Woodward says his company's DC-3 was the first executive plane in the world to be radar-equipped. Installation was made by Remmert-Werner, St. Louis, which also supplied the radome.

Total net weight increase, including a large inverter, was about 120 lb., since the plane's A-3 autopilot was removed when the radar was installed. Total cost was about $22,000.

Woodward stressed that the radar, which has been in operation more than 400 hr. to date, is showing a reliability at least equal to other airborne avionic gear such as radio.

Harold Curtis, chief pilot of a B-23 executive transport owned by National

Airborne Radar Scoreboard

Executive Aircraft

(All Bendix X-Band)

- Installed and flying:
  Cornell-Dubilier Electric Co. (DC-3); Forrest Oil Co. (Lodestar); Columbia Gas System (Lodestar); National Distillers (B-23); Kewanee Oil (DC-3); Bendix Aviation Corp. (DC-3).
- Installations in progress:
  Corning Glass (DC-3); Owens-Illinois Glass (DC-3); Kudner Corp. (DC-3).
- Installations programmed:
  Owens-Illinois Glass (DC-3); Mead Paper Co. (2 Lodestars); Murray Corp. (DC-3); Container Corp. of America (B-23); Mine Safety Appliance Co. (DC-3); Bendix Aviation Corp. (DC-3); Arthur Godfrey (DC-3); two Learstars.

Airlines

- BENDIX X-BAND
  National Airlines, about 30 sets for fleetwide installation on 4 DC-7s, 6 DC-6Bs, 6 DC-6s, 12 Convair 340s.
  Panagra, installation in 5 DC-7Bs; may extend installations to entire four-engine fleet.
  Northwest, evaluating equipment; will test Bendix C-band installation in the fall.

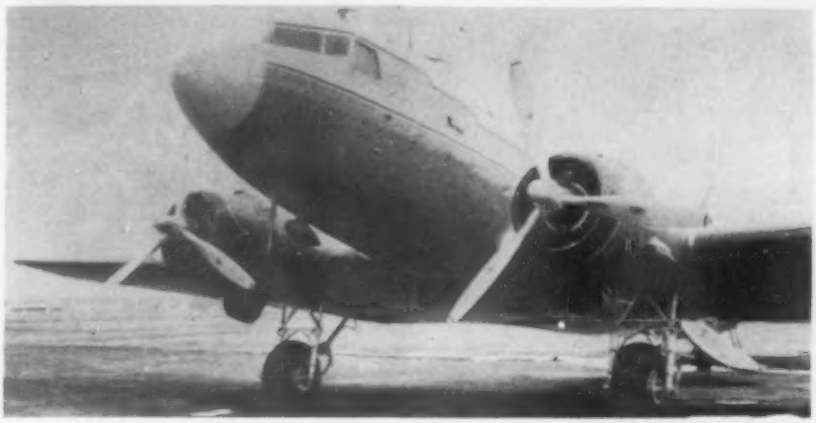
- RCA C-BAND
  United Air Lines, buying 200 sets; first installations now going into Convair 340s, then DC-6s, DC-6Bs and DC-7s.
  Pan American World Airways, will buy over 100 sets for 48 DC-6Bs, 7 DC-7Bs and 33 DC-7Cs; Douglas will install the equipment in the DC-7Cs; PanAm will handle the others.
  American Airlines, about 40 sets, for its 25 DC-7s now flying and 14 to be delivered next year.
  Trans World Airlines, about 20 sets for 1049G Super Constellations.
  Continental Air Lines, eight sets for DC-6B fleet.
  South African Airways and an undisclosed foreign airline, now evaluating equipment.

Distillers, reports: "We use our Bendix radar as a 'go no-go gage' as far as weather is concerned. . . . If it shows flyable conditions, we go, if not, we don't."

Here is how he described a recent experience near Youngstown, Ohio:

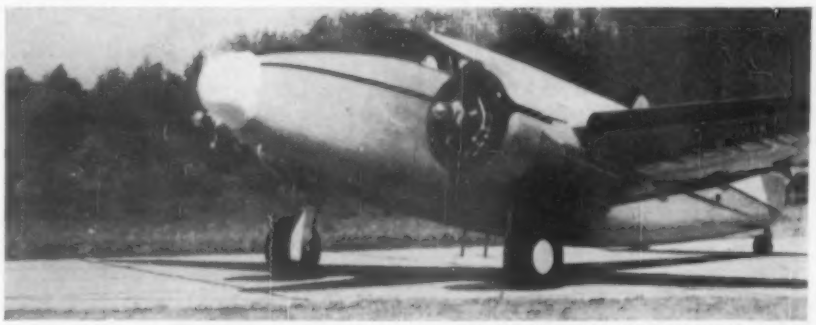
"A solid north-south squall line cut

Four Noses for the Weather . . .



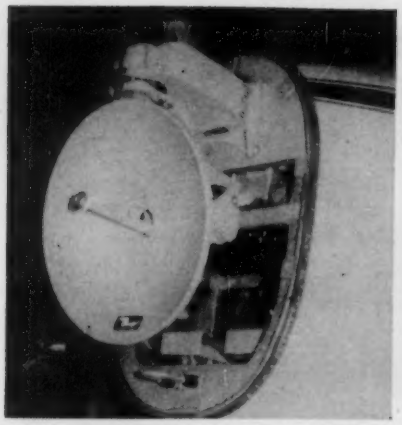
CORNELL-DUBILIER DC-3

NATIONAL DISTILLERS B-23

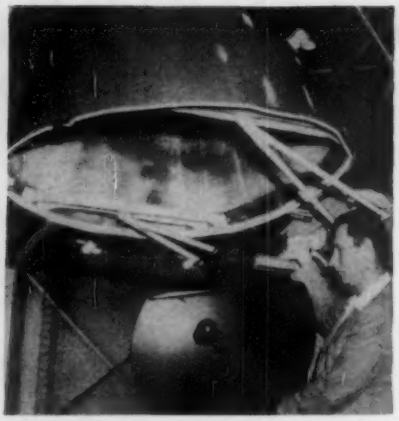


COLUMBIA GAS SYSTEM LODESTAR

UNITED AIR LINES CONVAIR 340



X-BAND radar scanner installed in Columbia Gas Lodestar by Remmert-Werner.



C-BAND scanner in UAL Convair 340 required extension of nose by 28.5 in.

straight across our path. There was no 'top' or 'bottom'. It was late afternoon. The radar clearly displayed storm cores, you could see them forming, changing shape and disappearing. Since it was evident that we could easily fly through the squall and avoid all highly turbulent areas, I remained at my 11,000 ft. cruising altitude and kept cruise power. Without radar, I would have immediately requested a lower cruise altitude and would have reduced speed as soon as turbulence was encountered.

"As it was, I never deviated more than five miles from my original course. Yet we encountered nothing more serious than light rain and slush and slight turbulence."

On another flight, out of New York, Curtis ran into a whole complex of violent thunderstorms. Here is what happened to three other aircraft in the same area:

Another B-23 was struck by lightning and its radio went up in smoke.

An Air Force B-26 pilot reported that he lost a landing gear door in severe turbulence.

A Navy R4D pilot radioed that violent gusts had wrenched an aileron off his transport and one wing was riddled with holes from lightning.

"Our radar allowed us to avoid all this mess, we didn't even slow down," Curtis says.

Ground Mapping

In good weather, Curtis often uses the radar for ground mapping for familiarization purposes. "The radar screen gives an exact facsimile of the map, provided there are hills or water in the area you are surveying," he says.

John E. Bierwirth, president of National Distillers, told AVIATION WEEK the radar allows him to make many flights which would normally be cancelled because of weather. And flights made through stormy areas stay closer to schedule than was possible before.

National Distillers' radar was put in by Aero Trades, Inc., Ronkonkoma, Long Island. Plane's nose was lengthened 22 in. to make room for radar installation without interfering with existing radio equipment in the nose. Accessibility is such that either radio or radar sets may be pulled in 30 min.

Installation moved the plane's center of gravity forward 1 in. This is good, says Curtis, since B-23s tend to be tail heavy.

Total cost is about $23,500, including $12,500 for the radar and for a Bendix-Red Bank 1,500-va. inverter to supply a.c. power to the radar; $1,600 for a plastic radome made by Ohio Aviation, Vandalia, the balance is cost of modification and installation.

Curtis agreed with Woodward that the RDR-1's reliability was on a par with the plane's other avionic equipment.

Lodestar Experience

Arthur W. Stewart, director of transportation for Columbia Gas System Service, had an RDR-1 installed in his company's Lockheed Lodestar by Remmert-Werner last April.

To date, the set has been in operation over 130 hours and is proving completely reliable, he says.

For the first three weeks, Stewart encountered no thunderstorms, so the radar was used for familiarization and for ground mapping.

As soon as summer arrived, the equipment began proving its worth in spotting storm centers. On one occasion, Pittsburgh Center relayed Stewart's reports of thunderstorm conditions aloft to other planes.

From the Logbook

Here are excerpts from the Lodestar's log: ". . . . Pittsburgh Approach Control required a turn for radar identification. . . . We advised turn to the left would be appreciated due to a thunderstorm immediately to our right. . . . After identifying turn made, radar directed us to airport. . . .

"On trip from Columbus to Albany, IFR via Youngstown, thunderstorms directly on airway to Youngstown. . . . Other airplanes in area reported severe turbulence and asked for changes in altitude. We circumnavigated majority of storm areas but were forced to fly through the line of storms—picked the narrowest spot between cells—mild turbulence encountered, but proceeded on course. During flight, radar showed a half hour period with no storms, so told steward to serve dinner while air was nice and smooth. . . .

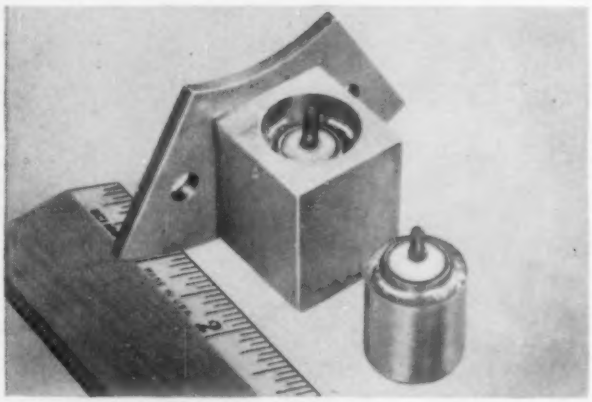
"On another flight, departed LaGuardia IFR to Charlestown at 8,000 ft. . . . Thunderstorms reported throughout entire area. Flight was approximately 50% VFR. Radar permitted us to avoid 12 to 15 thunderstorms without deviation from airway. No turbulence encountered. At one time when flying in and out of clouds, we would have ordinarily turned left to avoid a large build-up, but radar showed

NWA EVALUATES Bendix X-band in Stratocruiser, will test Bendix C-band in fall. Scope has been tried in various locations, here it is left and below control wheel hub.

This is A. L. Paquette, manager of aircraft equipment field sales

Mr. Paquette supervises those engineers specifically assigned to aircraft electrical systems, system components and accessories. On his team are *The Men With The Facts*. Contact him or one of the men working with him by writing to Westinghouse Electric Corporation, Aircraft Equipment Department, Lima, Ohio. They can tell you why Westinghouse can offer you:

Now! Power without problems



Shown here is a high-temperature diode, the Westinghouse development that made possible the design of a high-performance generator that doesn't use commutators, slip rings, carbon brushes or grease-lubricated bearings. J-91024-A

For more information on this revolutionary a-c generator . . . turn the page ⟶

YOU CAN BE **SURE**...IF IT'S

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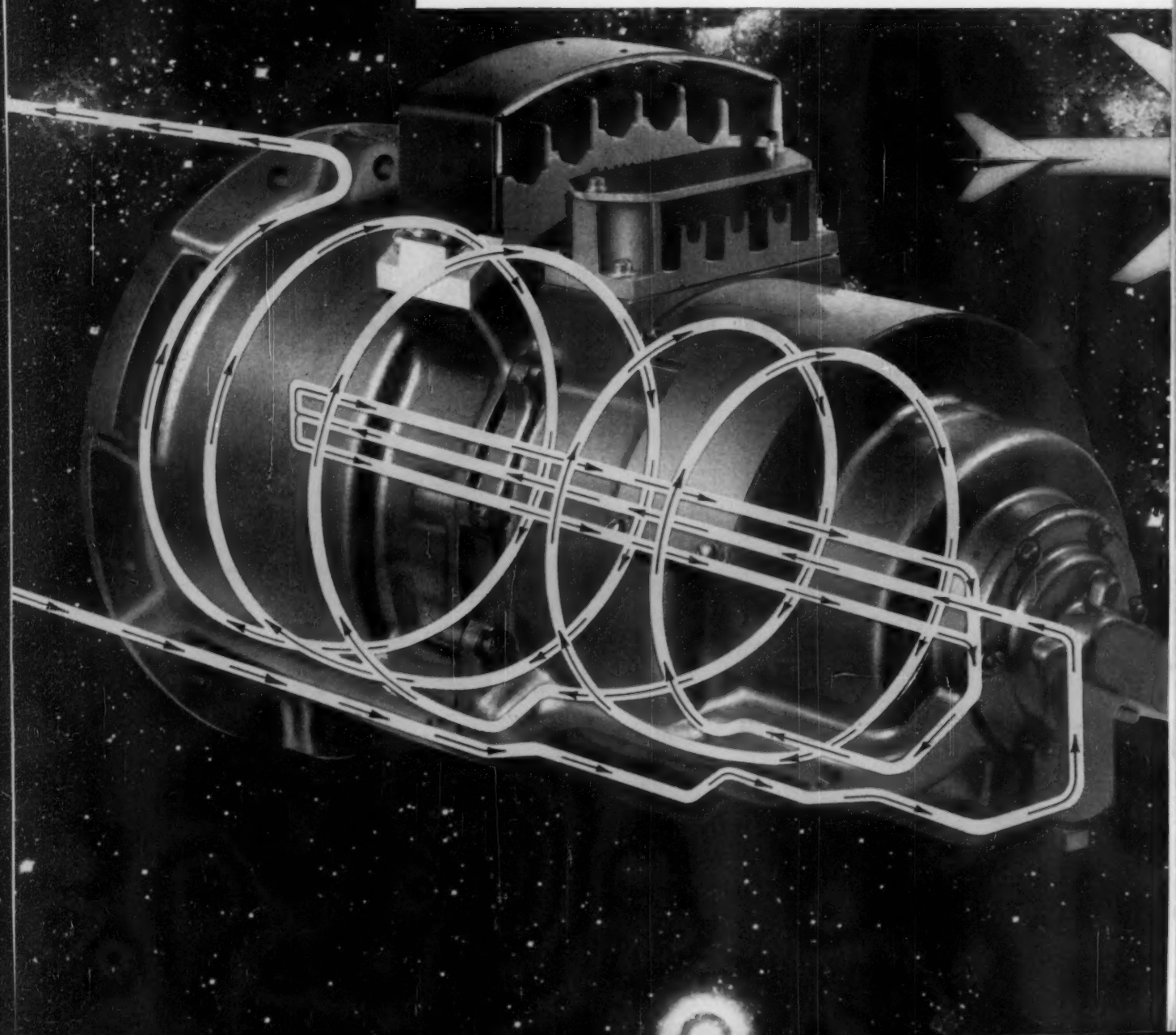
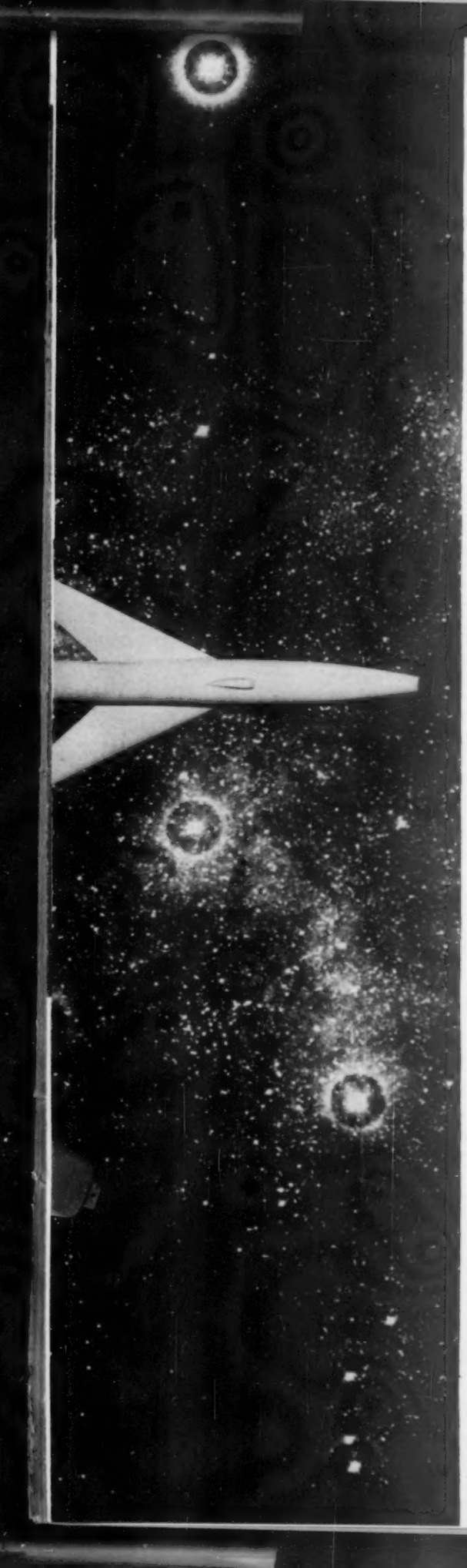
TOMORROW'S AIRCRAFT: *One step closer*

Now!

Power without problems





This revolutionary a-c generator is cooled and lubricated by engine oil . . . has no brushes, slip rings, commutator or grease-lubricated bearings . . . gives superior performance.

Westinghouse research in the field of semiconductors produced the high-temperature silicon diodes that are the key to the operation of this new generator. A-c power generated in the exciter armature is fed into the silicon rectifiers mounted on the generator shaft. The resulting d-c output supplies the main rotating d-c field.

Without brushes, aviation gas turbine engine oil can cool and lubricate the generator. Oil is pumped through the generator shaft, through tubes in the frame casting, and is used in the hydraulic constant-speed drive. All heat picked up by the oil is dissipated in the engine oil cooler. The generator operates safely with engine oil at temperatures up to 300 degrees Fahrenheit. All the usual generator trouble spots are eliminated—no brushes or commutating parts to wear, bearing lubricant is continuously replaced.

This is the first generator that is completely integrated with its drive, with the engine oil cooling system and with the balance of the electrical system. It is completely enclosed; there are no air tubes or ducts to occupy space and clutter up the airframe; all external oil seals are static and there is no overboard drainage of oil. No additional plumbing is required because the extension of the engine oil lubricating system is all internal. Now—aircraft altitude and speed will no longer be limited by the electrical system—a big step toward helping you bring tomorrow's aircraft . . . one step closer. J-91024-B

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Jet Propulsion • Airborne Systems Components • Wind Tunnels
Airborne Electronics • Airport Lighting • Ground Electronics
Aircraft Electrical Systems and Motors

YOU CAN BE **SURE**... IF IT'S

Westinghouse

us a line of storms all along that side of the airway which we avoided by making a slight turn to the right. . . .

"On IFR flight from Charlestown to Columbus, large, dark buildups visible at times. WX forecast thunderstorms en route. . . . Radar showed no storms in area. . . . We proceeded directly on course through these build-ups. . . . No turbulence encountered. Under normal conditions, we would have thought this to be a violent thunderstorm and avoided it."

This is what the log has to say about the radar when used for ground mapping: "On flight to Berlin, N. H., only DF stations available after passing Concord. . . . Atmospheric conditions prevented identifying stations until within five miles. . . . Radar mapping showed mountainous areas very clearly and we proceeded toward destination using radar for primary identification. . . . Passed Mt. Washington and arrived Berlin VFR. . . .

"Flight one week later required letdown at Berlin, using DF beacon. . . . Radar gave positive fix, showing mountains and valleys exactly as they appeared on the map. . . . Radar very satisfactory for ground mapping."

Only trouble reported during first three months were shorted receiver coils which burned out five resistors.

Quick Installation

Stewart and his helpers "pre-installed" all wiring necessary for the Lodestar's radar and hooked it up to a junction box in the plane's nose. The ship was then flown to St. Louis where Remmert-Werner installed the radar equipment in three working days. This included chopping off the nose, reinforcing the nose bulkhead, installing the scanner and mounting the Ohio Aviation plastic radome.

A 1,500-va. inverter was installed in the plane's tail to balance out the center of gravity.

Net weight penalty was about 140 lb., as 60 lb. of A-3 autopilot was removed. Since a Sperry Zero Reader was in the ship, its vertical gyro was used to stabilize the scanner.

Radome can be painted with standard, synthetic aircraft enamel, but striping paint cannot be used because of metallic content.

Stewart said that he went to the X-band radar for several reasons. Among them, he lists these:

- He had talked to several Military Air Transport Service crews who use APS-42 radar (X-band) and all of them, including Col. W. C. Draper, President Eisenhower's pilot, said they liked X-band, pointing out that it does allow you to look through rain very well.
- You can use the many Racon (ground) beacons scattered throughout the country, since the beacons are triggered by X-band (but not by C-band).
- In X-band you get a set that has been proven by thousands of hours of actual in-flight service.
- For equivalent scope definition X-band can use a smaller-diameter scanner than C-band radar.

The comment of an NWA pilot fairly well sums up the general attitude Aviation Week discovered in its survey of airborne radar:

"I have talked to pilots of other airlines who are testing airborne radar. We all wonder how we ever got along without it. Pretty soon the public won't fly in anything but radar-equipped airplanes."

New Oxygen-Air Unit For B-58 Hustler

A new weight- and space-saving dual oxygen-air regulator is being put into production by Aro Equipment Corp.

The regulator, which controls breathing oxygen flow to pilot and air to his G suit simultaneously, will be installed on Convair's supersonic bomber, the B-58 Hustler, and will be retrofitted on the North American F-100 Super Sabre and the McDonnell F-101 Voodoo, according to Aro,

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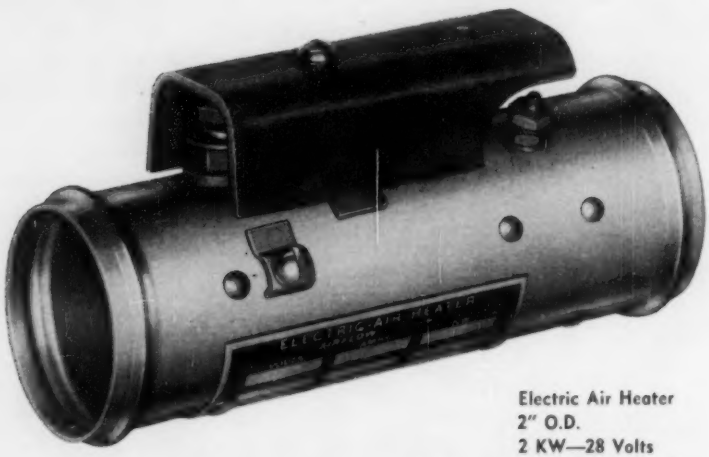

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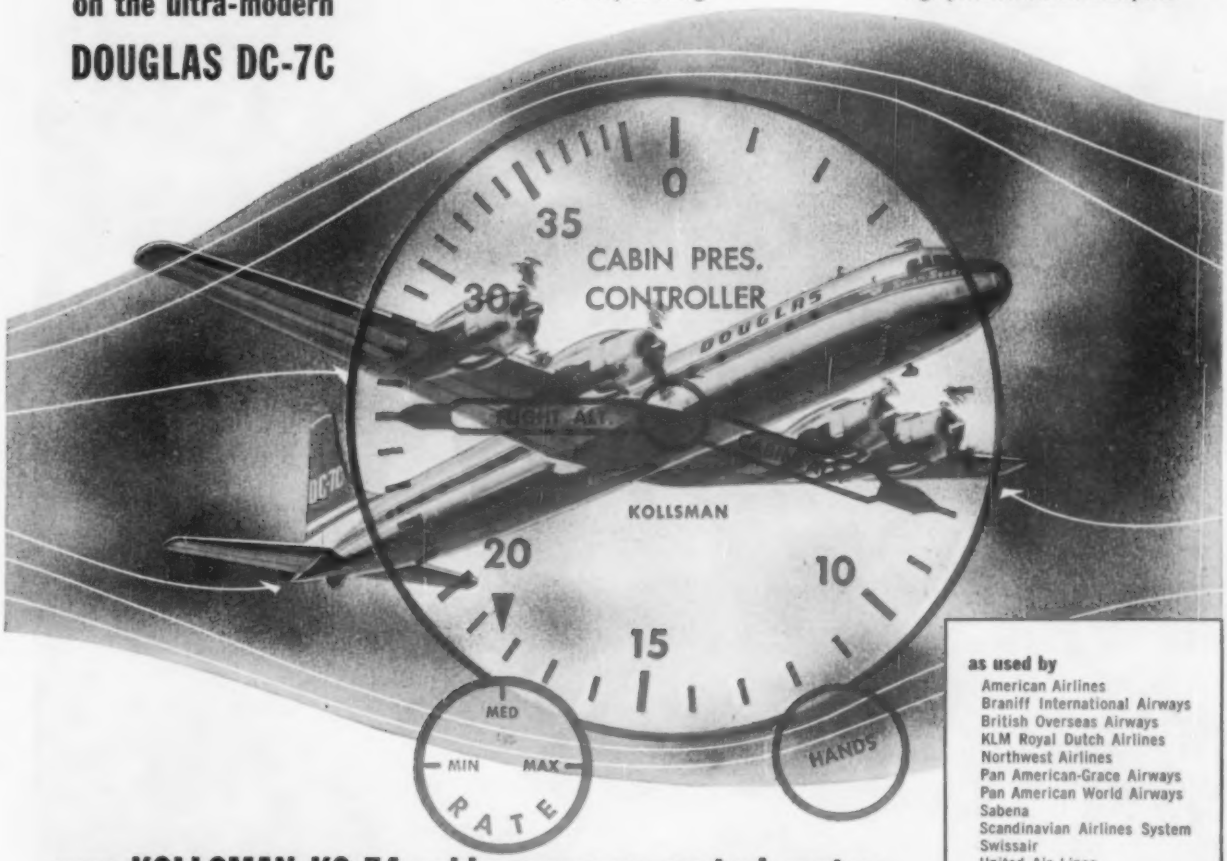

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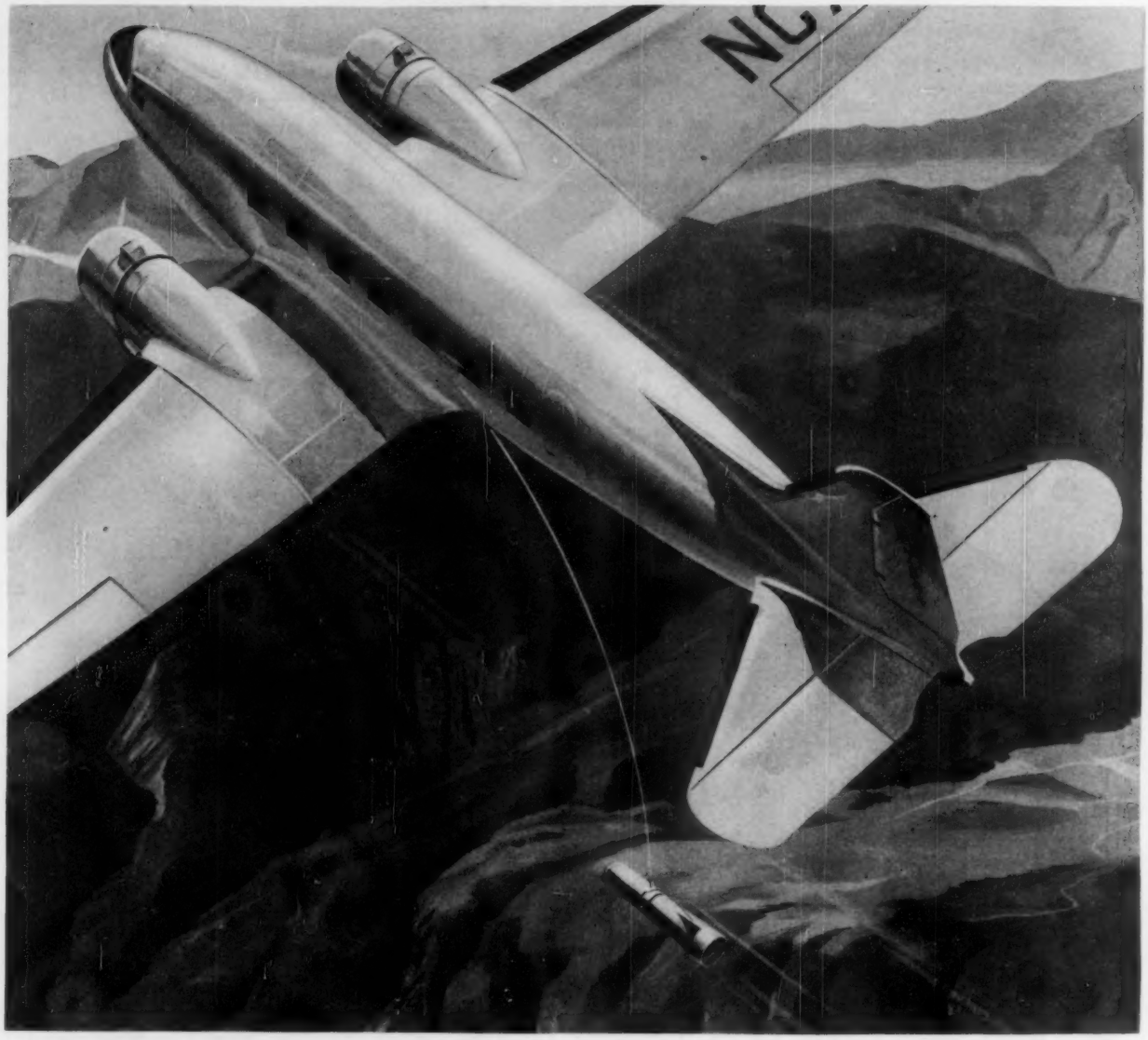

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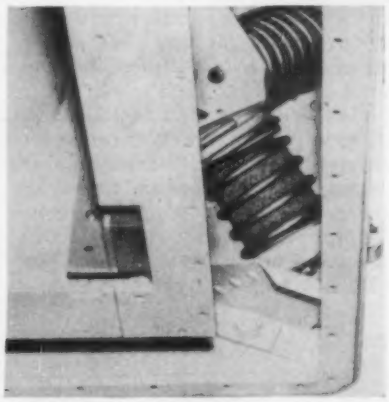


Containers Get Vibration Mounts

All-metal vibration mount system for protecting delicate mechanisms in transit reduces rocking of the equipment and is installed with only 2.5-in. clearance.

One model will support equipment weighing 160 to 180 lb. and will reduce a 50G shock by at least 80%, it is stated. Other systems can be designed for virtually any loads, the manufacturer claims.

The Met-L-Flex stainless steel resilient elements located within the springs provide a soft damping cushion. Containers are re-usable.

Robinson Aviation, Inc., Teterboro, N. J.

Recorder Checks Structure Strain

M-2 strain recorder, designed to expedite setting up and running of aircraft structure tests has capacity to scan the entire component while conditions remain fairly constant.

Standard unit has 250 channels. Bridge balance, point indication and point selection are grouped in panels of 50, although as many of the panels may be used as needed. Ranges run 0.999 microinches and 0-9,990 microinches per inch, automatically selected according to the signal's magnitude. Automatic recognition and polarity indication is provided so that gages for compression and tension may be connected as desired.

Readout is by numerical lamp indication and printed record on continuous form. An optional feature allows readout to IBM summary punch. Continuous forms are perforated for separation into 11 x 16-in. sheets, each one showing the strain at 50 positions for as many as 15 loadings.

Speeds: Zero setting, 1 to 5 sec. per point; scanning, one to two points per second.

Other optional features include additional groups of 50 bridge balances to a total of 450 for accommodation in the standard console. Additional groups of bridge balances can be handled on a separate rack.

G. F. Kelk & Co., 70 Sheffield St., N. Park P. O., Toronto, Canada.

New Machines Slated for Show

A number of new machine tool developments are scheduled for display by various manufacturers at the National Machine Tool Builders' Assn. Show in Chicago, Sept. 6-17. Among them:

Bullard

• **Master vertical turret lathe,** Model 75, with 76-in. cut, features a movable pendant control that directs feed and traverse of all heads, selection of feed rates, table speed rates and indexing of powered turrets.

• **Man-Au-Trol vertical turret lathe,** Model 75, with 26-in. cut. Completely automatic operation is possible with conversion unit that consists of two electrically controlled rotary detector drums and a function drum. Control drum can be pre-set in advance and placed into the machine in seconds.

• **Horizontal boring, milling and drilling machine,** Model 75, will be shown in 3 and 5-in. sizes, both fitted with the movable pendant. Chrome-hardened ways are provided for bed and saddle. The 5-in. machine features electronic automatic positioning.

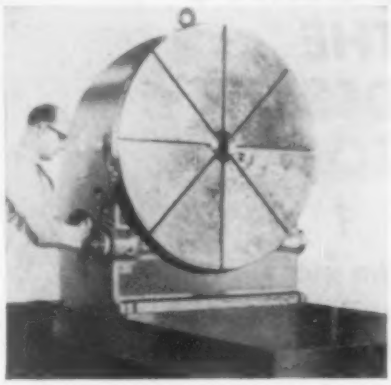
• **Type L Mult-Au-Matic** will be exhibited in a 10-in., 12-spindle and a 14-in., 8 spindle model. Other sizes are available. The 14-in. machine will have an automatic loading device.

Bullard Co., Bridgeport 2, Conn.

Pratt & Whitney

• **Precision 48-in. vertical rotary table** is designed for inspecting large, heavy aircraft workpieces, also to locate work on heavy equipment. Table dial gradutions read direct to 1 min. of arc, vernier graduations read direct to 2 sec.

• **Numerically controlled jig borer** uses



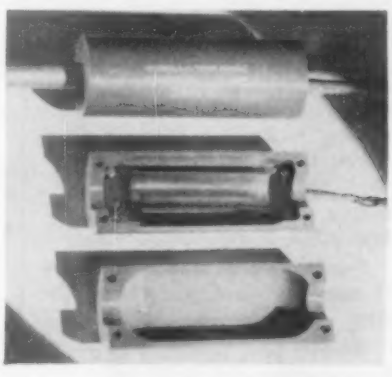
information fed into the machine to automatically position the work table to 0.0001-in. accuracy. Locating instructions for hole coordinates can be stored on punched cards or tape. Basic machine will be made up from standard components of P&W 2E Electrolimit jig borer with special drive gear boxes and controls. Other numerically controlled models comparable to company's 3E and 4E are being developed.

• **Die sinker 3C** handles heavy dies and has a hydraulic duplicator for tracer control operation. Spindle uses 3 hp. Spindle speeds range from 30-1,540 rpm. in 16 steps.

Potter & Johnston

Model 4-U automatic turret lathe is specifically designed to take full advantage of carbide cutting tools for fast removal of hard-to-machine new alloys. Chuck sizes are 10, 12 and 15 in. Motors from 15-25 hp. can be specified. Six automatic feed changes and four automatic speed changes from 45-1,177 rpm. are incorporated.

Potter & Johnston Co., Pawtucket, R. I.



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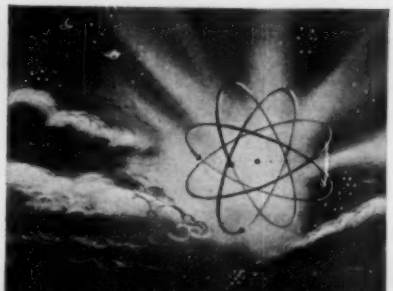

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probe that fits around the hydraulic line, the manufacturer points out.

Split cylinder casting thermally isolates that section of the line, while inside the cylinder a spring-loaded saddle bears against the wall. The saddle contains a temperature-sensitive high-resistance element.

Probes are wound at 20,000 ohms so that high outputs are obtained with relatively small temperature changes, it is stated. Units are made to fit all diameter hydraulic lines and can measure temperatures from −100 to 500F.

Arnoux Corp., Dept. AW-3, Box 34628, Los Angeles, Calif.

High-Sensitivity Bearing Tester

Ball bearing torque tester with a sensitivity to 7 mg.-mm. is designed for development and production tasks and meets MIL-STD-206.

Full-scale ranges are adjustable from 700-0-700 mg.-mm. to 50,000-0-50,000 mg.-mm.

A micro relay, incorporated in the circuit, controls a "go-no-go" indicator, or the device may be operated with a recorder to present torque values graphically. Unit is said to take almost any ball bearing size.

Overall accuracy is claimed to be within 5% and readings are independent of line voltage variations.

Sunshine Scientific Instrument, 1810 Grant Ave., Philadelphia 15, Pa.

Submerged Pump for Small Jets

Designed for small jet-powered aircraft, Model RG-11100-2 submerged fuel booster pump has a weighted valve that causes fuel to enter the equipment through the standpipe's extreme end during inverted flight. Standpipe is of special length to permit pumping to a low fuel level in the tank. Fuel is pumped through the lower end of the standpipe for normal operation.

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Greater reliability under even the most rugged conditions. The high-performance aircraft of today (and the future) place a far more severe, far more complex demand on the auto pilot. To meet the need for greater reliability under the most rugged conditions, the Bendix PB-20 is *completely transistorized* . . . and is, in fact, *the first such automatic flight system to be placed on the market!*

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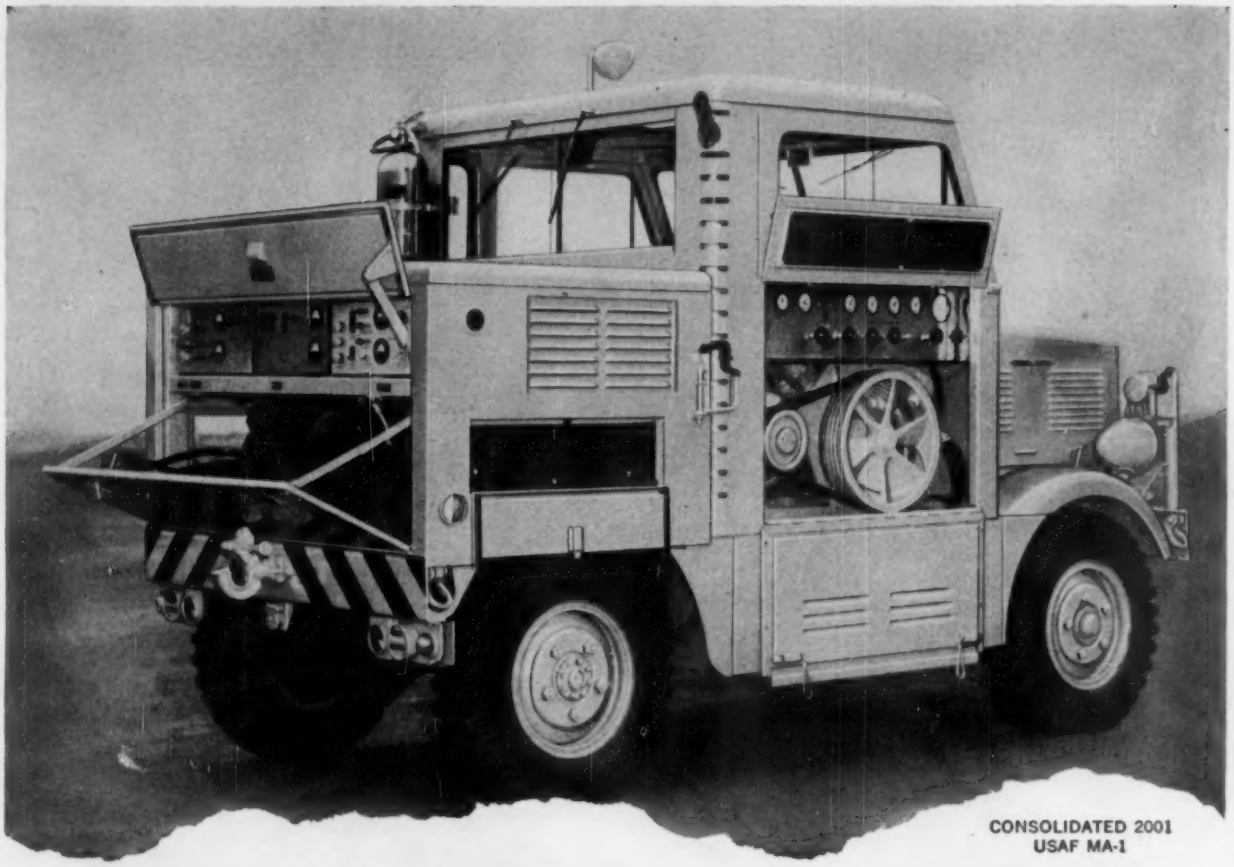
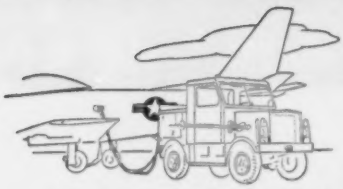


CONSOLIDATED 2001
USAF MA-1

GROUND SUPPORT !



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minimum, which is obtained in normal or inverted flight. Ambient temperature is −67F to 160F, altitudes to 35,000 ft.

Motor is 0.25 hp. at 7,200 rpm., 27-v., d.c. and 15 amp., continuous duty. The equipment weighs 6.5 lb.

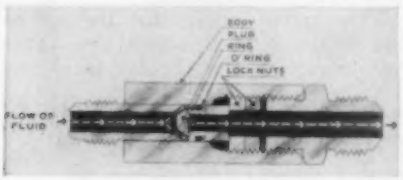
Lear-Romec Div., Lear, Inc., Elyria, Ohio.

ALSO ON THE MARKET

"Building block" 30-kw. induction heater has coils that can be selected for specific applications, making unit useful for hardening and heat-treat, metal joining, hot-heading and forging. —Westinghouse Electric Corp., P.O. Box 2099, Pittsburgh 30, Pa.

Latchin relay, magnetically held and electrically reset, is hermetically sealed in a 1-in.-dia. enclosure 1⅞-in. long, excluding terminals. Weight is 3.3 oz. Units are available in two, four and six pole double-throw contacts and meet MIL-R-5757B and MIL-R-25018 (USAF). Temperature range: −65C to 125C. Shock range to 50G—Filtors, Inc., Port Washington, N. Y.

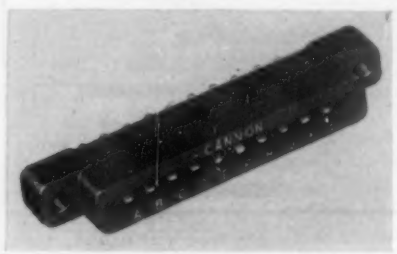
Hydraulic fluid metering device eliminates need for filters, maker reports.



Flow control is regulated by surface finish of the plug seat.—Magnetic Seal Corp., Higgins St., Georgiavile, R. I.

Thermatool high-frequency resistance welding process uses HF reactance effects to direct and pinpoint current into edges of the joints, is said to provide greater energy concentration than other methods.—New Rochelle Tool Corp., 318 Main St., New Rochelle, N. Y.

Connectors for printed circuit devices range from 10, 18, 22, 28 to 44 contacts with fittings made of du Pont Zytel molded insulation with gold-plated phosphor-bronze or beryllium-copper contacts. Flashovers are 2,000 v. and 2,500 v. 60 cps. a.c. rms., with current rating of 5 amp.—Cannon Electric Co., P.O. Box 75, Lincoln Heights Station, Los Angeles 31, Calif.



Solid carbide countersinking tool has flattened non-cutting edge higher than cutting edge which is on a rounded dip. Round chip clearance hole is centered in the cutting edge. Features are slated to eliminate chatter or vibration.—Raymac Division, Dexco Corp., 15490 Dale Ave., Detroit 23, Mich.

Motor generator set consists of a 60-cycle induction motor of low-slip design driving a 31.25-kva., 25-kw., 380-420-cycle generator. Frequency changes are made with a hand crank.—Kato Engineering Co., Mankato, Minn.

Portable self-contained air compressor for pneumatic equipment, Model 100, plugs into 110-220 v. a.c. and delivers up to 100 psi. and 3 cfm. free air. Unit has ¼-hp. motor with capacitor and overload protector.—Modernair Corp., 400 Preda St., San Leandro, Calif.

Magnesium primer 40X-675 provides protective film of 1.5 mils after dipping or spraying. Material is said to resist aircraft hydraulic fluids.—Stanley Chemical Co., E. Berlin, Conn.

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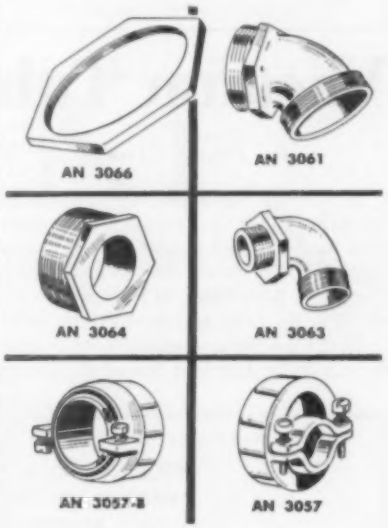

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Aviation Week Transistor & Mag Amplifier

The increasing tempo of avionics industry announcements of new transistorized equipment in recent months suggests that the use of transistors is gaining momentum. To obtain a quantitative measure of this trend toward transistorization, and the use of magnetic amplifiers, another vacuum tube substitute, AVIATION WEEK submitted survey questionnaires to a sampling of small, medium, and large-size avionics manufacturers.

The article below is the first of two based on the survey.

Nineteen of the 21 manufacturers in the survey returned the questionnaires. Although no single one was developing equipment in all seven categories, of equipment listed in the questionnaire, there were nine to 14 returns for each type, except under the heading of "Miscellaneous."

These companies participated in AVIATION WEEK's survey: Bendix Radio, Bendix-Pacific, Collins Radio, Eclipse-Pioneer, Federal Telecommunications Lab, GE Light Military Electronic Equipment Dept., GE Aircraft Instrument Dept., Gilfillan, Hazeltine, Lab For Electronics, Lear, Litton Industries, Glenn L. Martin, Minneapolis-Honeywell, Radio Corporation of America, Sanders Associates, Sperry Gyroscope, Westinghouse Electronics and Air Arm divs.

Hughes Aircraft and North American Aviation declined to participate.

Vacuum Tubes Face Fast-Rising Threat

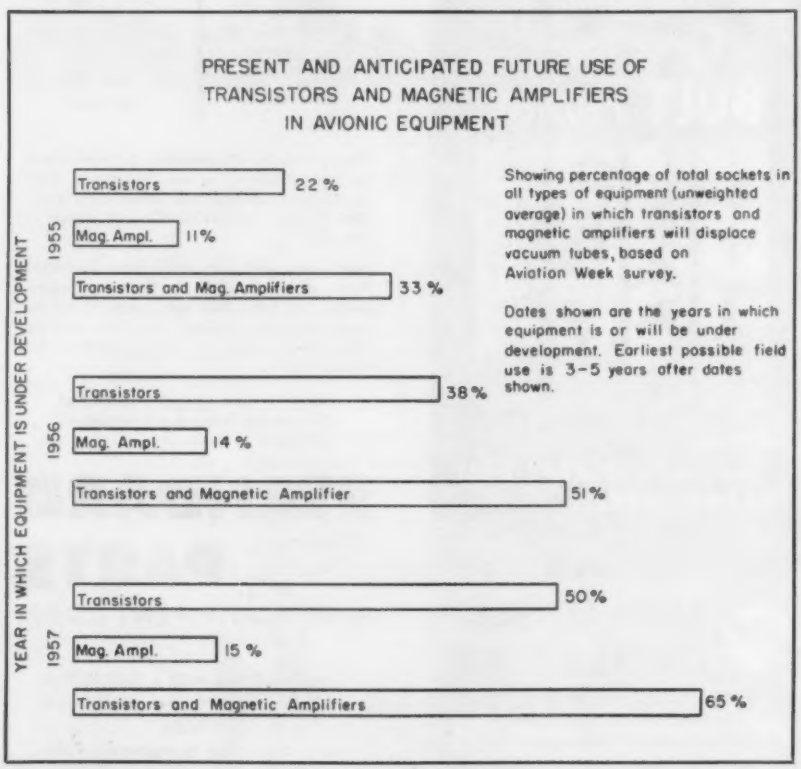
By Philip Klass

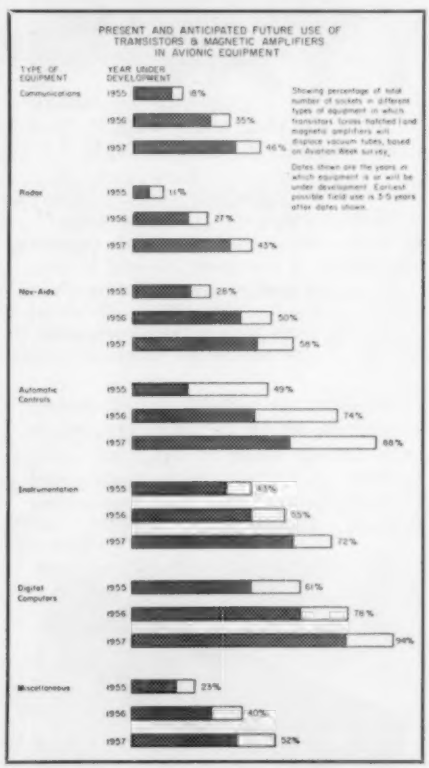
Transistors are replacing 22% of the vacuum tubes in avionic equipment now under development by 19 manufacturers, an AVIATION WEEK survey discloses. This figure is expected to rise to 38% by 1956 and to 50% by 1957.

With magnetic amplifiers, transistors appear to be a serious threat to vacuum tubes in avionic equipment, the survey indicates. The two tube substitutes are being used in 33% of the sockets in avionic equipment now under development. This figure is expected to jump to 51% in 1956 and to 65% in 1957.

Based on the normal three-to-five-year interval between development and initial field service, it appears that by 1960-62, transistors will be found in an average of nearly 50% of the sockets in new equipment going into field use. Digital computers, on the average, will run even higher, approximately 77% transistorized, the survey shows. Some individual equipment models will be completely transistorized.

The survey reveals that the use of magnetic amplifiers, which have made significant inroads on tubes in certain


PRESENT AND ANTICIPATED FUTURE USE OF
TRANSISTORS AND MAGNETIC AMPLIFIERS
IN AVIONIC EQUIPMENT
YEAR IN WHICH EQUIPMENT IS UNDER DEVELOPMENT
1955
Transistors 22 %
Mag. Ampl. 11%
Transistors and Mag. Amplifiers 33 %
1956
Transistors 38 %
Mag. Ampl. 14 %
Transistors and Magnetic Amplifier 51%
1957
Transistors 50 %
Mag. Ampl. 15 %
Transistors and Magnetic Amplifiers 65 %
Showing percentage of total sockets in all types of equipment (unweighted average) in which transistors and magnetic amplifiers will displace vacuum tubes, based on Aviation Week survey.
Dates shown are the years in which equipment is or will be under development. Earliest possible field use is 3-5 years after dates shown.



GROWING USE of transistors and mag amplifiers in all types of avionic equipment is shown left; breakdown by type is at right.

"She not only thinks—she even dreams!" These are the words which express the full implication of NIKE, the new guided missile that has a vital part in defense planning. NIKE seeks, locates, and destroys an airplane... another missile... anything that flies. The deadly reliability of her guidance system depends in part on *SYNCHROS* which translate electrical impulses into positioning data.

NIKE

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"Winged Victory" is the familiar name of this Greek statue of NIKE, goddess of victory, found at Samothrace, (circa 300 B.C.). Her name (pronounced 'Ny-Key') was selected by Army Ordnance as most appropriate for the ground-to-air missile developed for them by Bell Telephone Laboratories. Norden-Ketay is proud to have been chosen as an integral part of the team which produced NIKE.

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- Gain = 1000X

The Model 62 Amplifier contains its own power supply. It is designed for general laboratory use and for multi-channel instrumentation applications when microvolt input signals must be amplified. Typical uses are the amplification of outputs from DC-excited strain gages, thermocouples, and other transducers capable of providing intelligence signals down to DC.

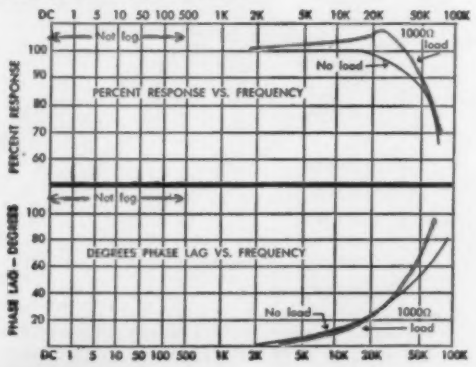
Accessories include laboratory housings which provide front panel input and output connections, rack adapters to permit accommodating up to six amplifiers in 8¾" panel space of a standard rack, strain gage bridge balance and supply, and an output amplifier to permit driving pen motor recorders or high frequency string galvanometers.

Inquiries for further information will receive prompt attention.
Write to Sales Engineering Department, Electro-Mechanical Research, Inc., Ridgefield, Conn.

CHARACTERISTICS

Gain	1000 ±1%.
Input impedance	200,000-ohm calibrated input potentiometer provided.
Output range	0-±5 volts max. for load impedances greater than 1000 ohms. 0-±5 ma. max. for load impedances in range of 1000 to 250 ohms.
Stability	Output zero offset never exceeds ±20 μv referred to the input, after 5 minutes warm-up, if line supply is 115 volts regulated. ±10 volts variation in 60-cycle supply results in additional zero shift of less than ±25 μv.
Chopper intermodulation	Less than 2% of actual signal level. Occurs only in the vicinity of 60 cps and its harmonics.
Noise	Less than 15 μv equivalent input.
Linearity	±0.25% of full scale.
Frequency response	Flat within ±2% from DC to 10,000 cps.
Dimensions	Basic amplifier: 2¾" W x 8" H x 12¼" D. Laboratory housing: 4¾" W x 8½" H x 14½" D.

TYPICAL PERFORMANCE CURVES


DC 1 5 10 50 100 500 1K 2K 5K 10K 20K 50K 100K
Not log
10000Ω load
No load
PERCENT RESPONSE VS. FREQUENCY
PERCENT RESPONSE
100 90 80 70 60
Not log
DEGREES PHASE LAG VS. FREQUENCY
PHASE LAG – DEGREES
100 80 60 40 20
No load
10000Ω load
DC 1 5 10 50 100 500 1K 2K 5K 10K 20K 50K 100K

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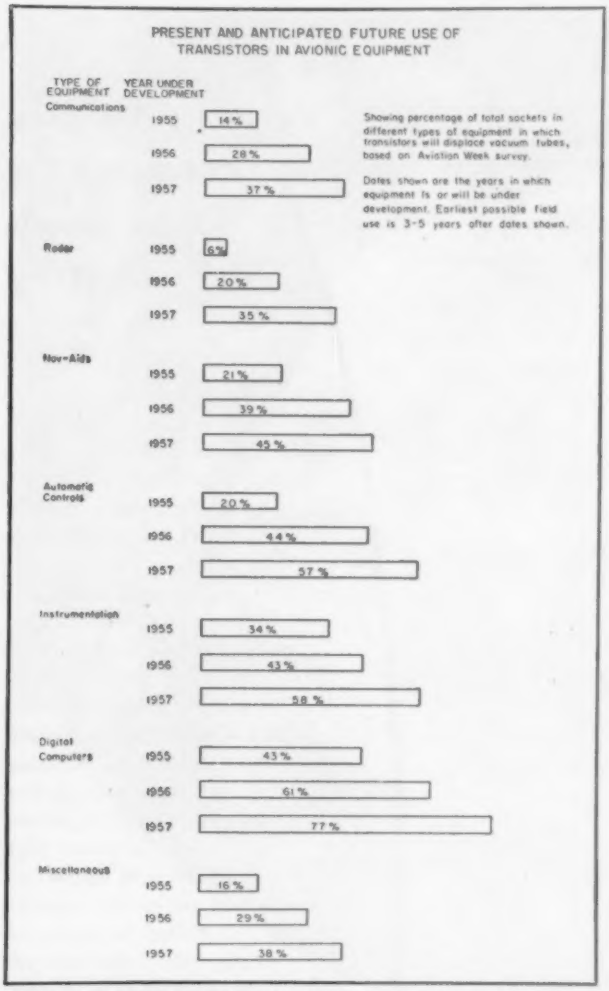
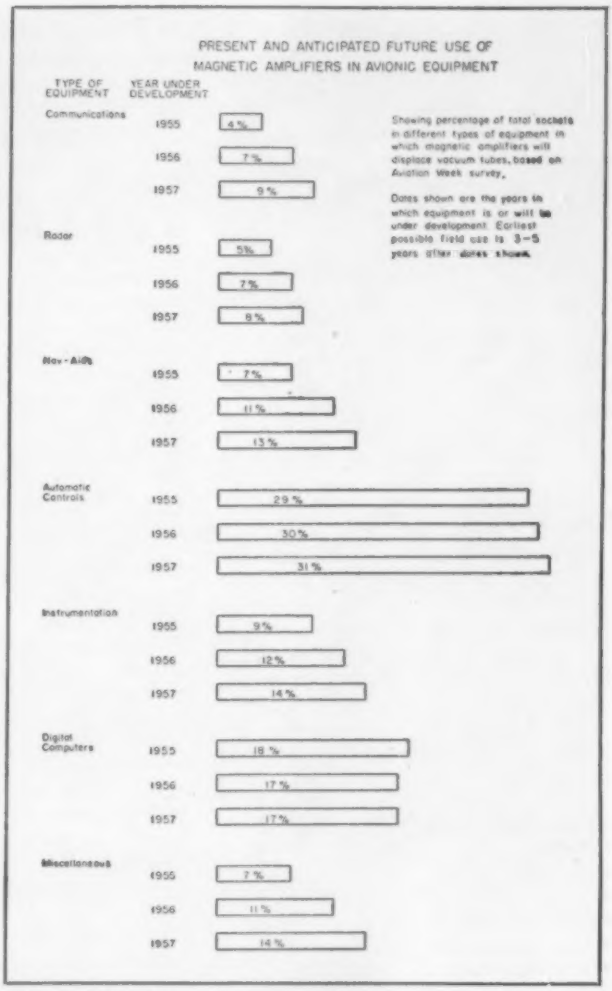
RIDGEFIELD CONNECTICUT





AVIATION WEEK SURVEY RESULTS, broken down by equipment types, show transistor and mag amplifier inroads on tubes.

applications in the past few years, will show little additional gain.

Approximately 11% of the sockets in avionic equipment now under development will use mag-amplifiers. However, the figure is expected to rise only to 14% in 1956 and 15% in 1957, AVIATION WEEK's survey indicates.

Mag amplifiers now find their biggest use in automatic controls (29% of the sockets) and digital computers (18% of the sockets).

The terminology used in the survey questionnaire may tend to overstate the number of tubes which will be displaced by transistors while understating the number displaced by mag amplifiers. The survey asked what percentage of the total sockets would use a) transistors, and b) mag amplifiers. The distortion may result from the fact that in many applications several transistors are required to provide the equivalent gain of a single multi-purpose tube, or a single magnetic amplifier may perform the functions of several tubes.

One avionics manufacturer told AVIATION WEEK its experience indicates that approximately three semi-conductors (diodes and transistors) are required on the average to replace one multi-purpose tube. Another firm reports that one mag amplifier replaces an average of three tubes.

Trend To Transistors

AVIATION WEEK's survey indicates that the following percentages of sockets in equipment currently under development will use transistors, based on an average of all firms reporting:

- **Communications sockets:** 14%.
- **Radar sockets:** 6%.
- **Nav-aid sockets:** 21%.
- **Automatic control sockets:** 20%.
- **Instrumentation sockets:** 34%.
- **Digital computer sockets:** 43%.
- **Miscellaneous sockets:** 16%.
- **All equipment types (average):** 22%.

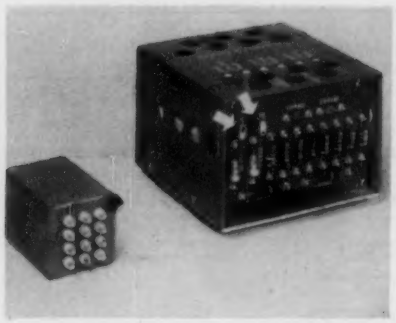
It is evident that transistorization has made greater inroads in digital computers, automatic controls, nav-aids, and instrumentation than in communication and radar equipment. The reasons are to be found in the characteristics and operating limitations of transistors which currently are in production.

Presently available transistors, particularly the high-temperature silicon units needed for most airborne equipment, generally have characteristics which make them best suited to low-frequency audio and servo-mechanism use, or to switching (flip-flop) applications in digital computers.

It has been only recently that transistors capable of operating at or above 10 mc. have become available, and some of these units are germanium devices with high-temperature limitations.

The fact that at present there are no semi-conductor substitutes for the high power tubes used in the output stages of radio transmitters is another reason why communications equipment lags in transistorization.

However, recent developments in high-frequency transistors hold out hope of opening up more radio frequency applications for the devices. These include Bell Labs' intrinsic barrier (p-n-i-p) units (AW Sept. 6, 1954, p. 11), Texas Instruments' new high-temperature silicon tetrode transistors (AW Aug. 23, 1954, p. 41), production availability of Philco's surface barrier transistors (AW June 21, 1954, p. 62),



TRANSISTORS and mag amplifiers (white and black arrows) are fast displacing tubes in automatic controls such as this new Collins automatic pilot.

and the still newer field effect transistors (AW June 27, p. 50).

Two Years From Now

These and other new semiconductor developments, spawned by the vast amount of research and development in this field, probably account for the accelerated pace of transistorization which the survey indicates avionic equipment manufacturers anticipate.

Here's what the survey shows for equipment under development in 1956 and 1957.

	1956	1957
• Communications	28%	37%
• Radar	20	35
• Nav-aids	39	45
• Auto. controls	44	57
• Instrumentation	43	58
• Dig. computers	61	77
• Miscellaneous	29	38
• All equip. types, average	38	50

By 1957, nearly every avionics manufacturer surveyed expects to be using transistors in every category of equipment it has under development.

Magnetic Amplifier Trends

Magnetic amplifiers have made significant inroads on vacuum tubes, considering that the device was first introduced in the avionics field around 10 years ago, after tubes had been long established. This is evident from the survey results, if it is remembered that one mag amplifier usually replaces two or more tubes.

For equipment presently under development, avionic manufacturers report the following percentage of sockets will employ mag amplifiers:

- Communications: 4%.
- Radar: 5%.
- Nav-aids: 7%.
- Automatic controls: 29%.
- Instrumentation: 9%.
- Digital computers: 18%.
- Miscellaneous: 7%.
- All equipment types (average): 11%.

However, the survey of anticipated mag amplifier use for 1956-57 indicates little additional increase. The reason is the increased use of transistors. This is demonstrated in the returns from two avionic manufacturers reporting on their automatic control developments:

Manufacturer "A" reports that currently it is using transistors in 20% of the sockets and mag amplifiers in the other 80%. (No tubes.) By 1956, the transistors are expected to jump to 70% of the sockets, with mag amplifiers dropping to 30%. And by 1957, transistors are expected to fill 90% of the sockets, with mag amplifiers filling the remaining 10%.

Manufacturer "B" reports a similar trend. At present the figures are 25% for transistors, 35% for mag amplifiers and 40% for tubes. By next year the figures are expected to run 50% transistors, 30% mag amplifiers, and tubes 20%. By 1957, the figures quoted give 75% for transistors and the remaining 25% magnetic amplifiers, with tubes completely out.

Still another manufacturer, which two years ago was redesigning all its new automatic controls and instruments to use magnetic amplifiers, has now shifted completely to transistors.

The industry's views on the future use of magnetic amplifiers reflects the feeling that, except possibly in the field of computers, little can be done to open up new roles for the magnetic amplifier. By contrast, the field of semi-conductors appears to hold promise of many new devices and uses.

One unknown which might slow the switch from mag amplifiers to transistors is the question of reliability. Well-designed and constructed magnetic amplifiers have accumulated an excellent reputation for reliability which transistors cannot yet match, despite recent improvements.

Here's what the survey shows the avionic manufacturers expect to use in the way of magnetic amplifiers in 1956 and 1957 developments, in terms of the percentage of total sockets:

	1956	1957
• Communications	7%	9%
• Radar	7	8
• Nav-aids	11	13
• Auto. controls	30	31
• Instrumentation	12	14
• Dig. computers	17	17
• Miscellaneous	11	14
• All equip. types (average)	14	15

Despite the industry's growing use of transistors and magnetic amplifiers in equipments now under development, and their many potential advantages, the introduction of transistorized equipment into field service may be slowed by military procurement policies.

This and other aspects of the trend to transistorization will be considered in next week's article.

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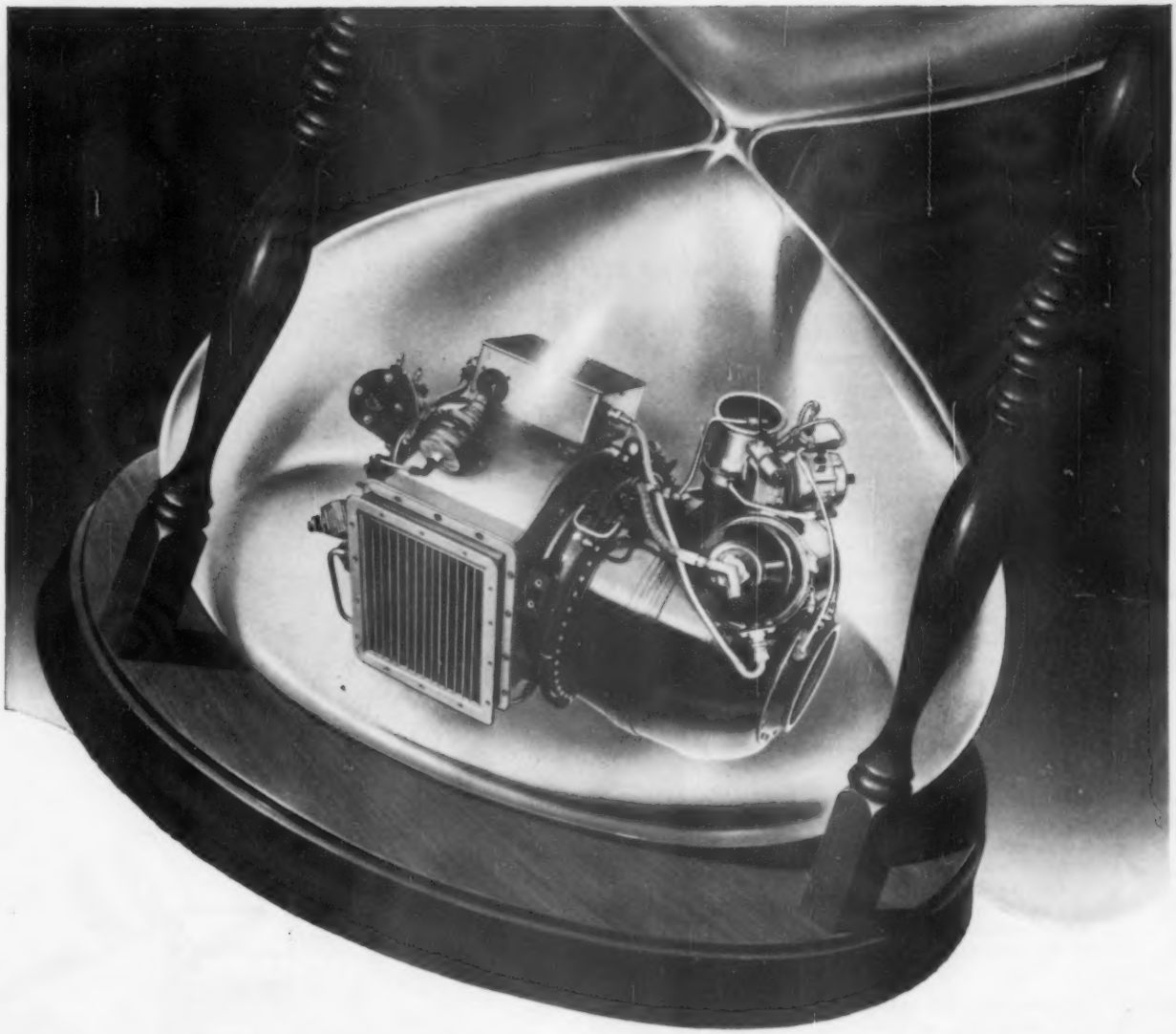

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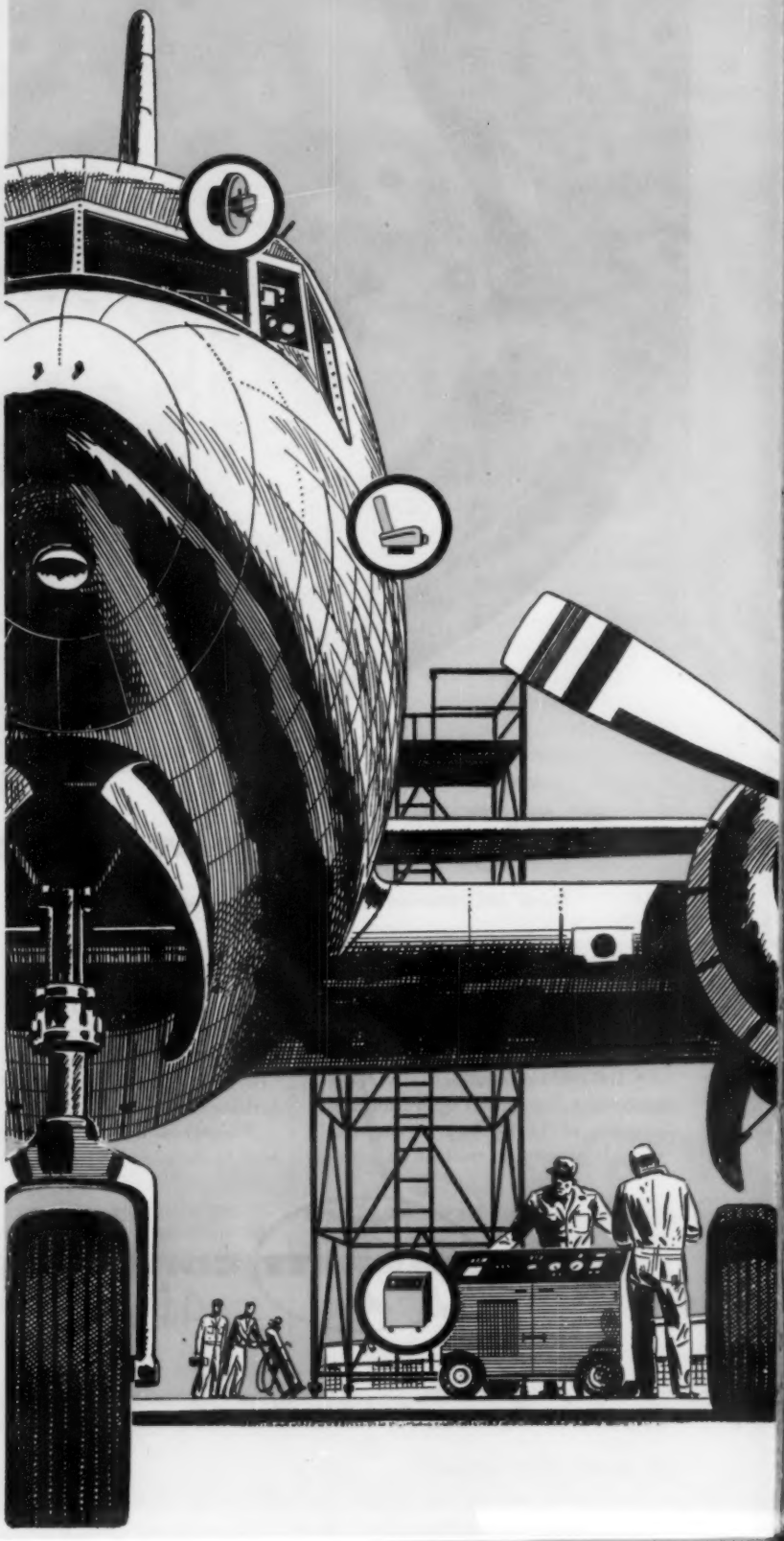

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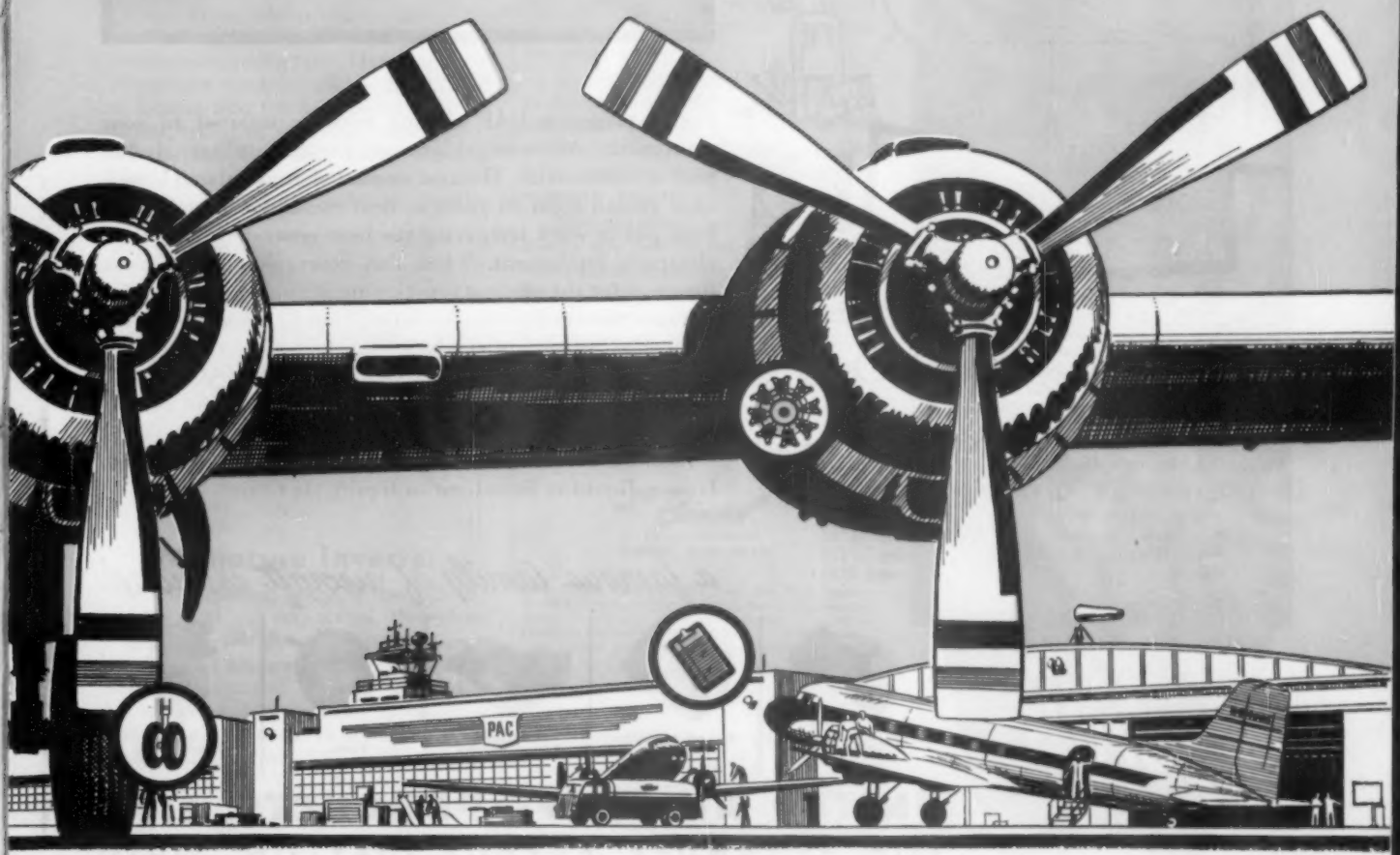
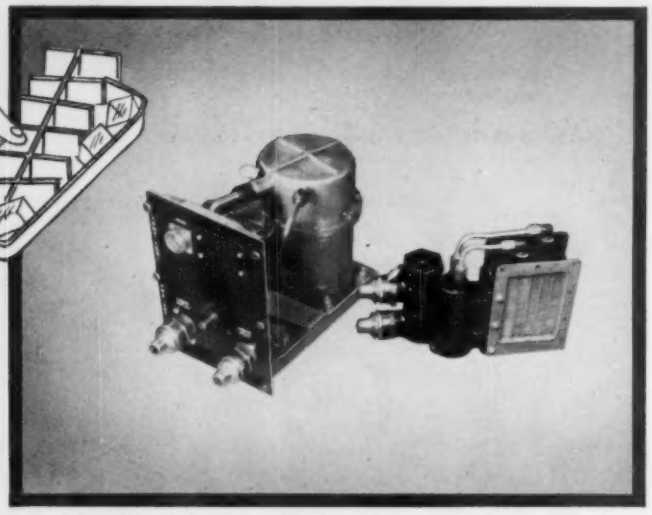


7801

There are BETTER ways to cool off Electronic Equipment!



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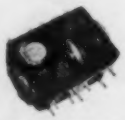
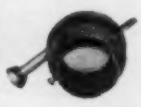


Diverter Segregator Valves

Cold Weather System Hoppers



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Fuel Control Valves

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Avionics Companies Add New Facilities

Westinghouse Electric Corp. will build a new semi-conductor manufacturing facility, described as "the most highly automatic of any of the company's plants," at Youngwood, Pa. The new facility, to be completed late this year, will employ 400-500 persons by the end of 1956, Westinghouse says.

Other expansions include:

• **Motorola, Inc.**, has broken ground for a new $1½-million transistor manufacturing facility in Phoenix, Ariz. The 58,000-sq. ft. plant, slated for completion late this year, is expected to employ 300-500 people.

• **Bendix Radio** will build a $2-million engineering building adjacent to its present Towson, Md., plant. The new 100,000-sq. ft. facility, slated for occupancy by July 1956, will accommodate 500 employes.

• **Astron Corp.**, East Newark, N. J., manufacturer of capacitors and filters, is adding 20,000 sq. ft. of manufacturing space to its present plant.

• **Texas Instruments, Inc.**, Dallas, major transistor manufacturer, has opened a Los Angeles district office at 1741 Ivar Ave., as the first step in establishing marketing headquarters throughout the U.S.

• **Hoffman Electronics Corp.**, Los Angeles, has purchased National Fabricated Products, Inc., Chicago semiconductor manufacturer. Hoffman's new acquisition produces silicon diodes and is moving into the field of silicon transistors, rectifiers, and solar batteries.

• **J. B. Rea Co., Inc.**, Santa Monica, Calif., producer of automatic control and data processing machines, recently has acquired two California firms as part of an expansion program. The J. L. A. McLaughlin Corp., La Jolla, engaged in the development and manufacture of long-range communications, becomes a new subsidiary, while Robey Rotor, Inc., Culver City, maker of miniature gyros and motors, becomes a division of J. B. Rea. Company says it is searching for other firms and products to integrate into its expansion program which will be financed with a public stock offering in the near future.

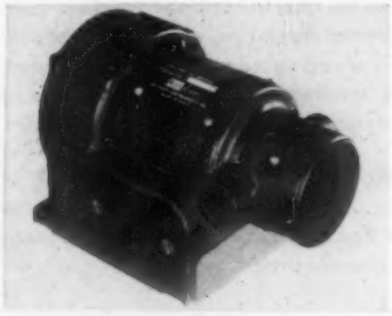
• **Meletron Corp.**, Los Angeles, manufacturer of pressure-actuated switches, will build a $1-million factory at a recently purchased site in the San Fernando Valley. New factory is expected to open early in 1958.

• **Filtron Co., Inc.**, has opened a new 10,000-sq. ft. plant in Culver City, Calif., at 10023 West Jefferson Blvd. Facility will be used for research, testing, and production.

• **Potter Instrument Co.**, Great Neck, N. Y., has increased its production facilities by 15,000 sq. ft.

• **Cook Electric Co.**, Chicago, has opened a district office in Wichita, Kan. Address: 6405 East Kellogg.

• **P M Industries**, Stamford, Conn., has purchased Instrument Motors Co., also of Stamford, to expand its line of a.c. and d.c. motors.



Miniature Inverter

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SERVICE PROVED AND UNIVERSALLY APPLIED since 1951, Robinson multi-directional mountings are now preferred for practically all military and commercial aircraft and in the newest of the guided missiles.

RADICALLY DIFFERENT from all other shock and vibration control mountings, this Robinson mount furnishes unique performance because of the inherently damped resilient cushions of patented Met-L-Flex, exclusively Robinson. No auxiliary damping means is required or used. Met-L-Flex is unaffected by attitude, extremes of temperature, aging, or the presence of oil, dust or dirt.

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▶ **Symbolic Logic Made Easy**—If the increasingly popular language of digital computers is all Greek to you, or you're curious as to how binary arithmetic is performed, write for the excellent 16-page primer on the subject prepared by Computer Control Co., Inc.: "Symbolic Logic, Binary Calculation & 3C-Pacs." Company's address: 92 Broad St., Wellesley 57, Mass.

▶ **One-Millionth of a Flea-Power**—Summers Gyroscope Co., Santa Monica, Calif., has developed a tiny integrating motor rated at 50-trillionths of a horsepower. Device operates over a 50,000:1 voltage range (0.001 to 50 volts), with speed proportional to applied voltage to within 0.1%, Summers says. Over its operating range, motor runs at 4½ revolutions/second/volt.

▶ **Super-Duper Navigator**—With tongue in cheek, and a facetious twinkle in its corporate eye, Narco has announced a new "super navigator" which combines VOR, DME, Tacan, radar, autopilot, and a 4,600 channel communications in box smaller than cigarette pack.

The new device, called Endital, "should cost less than $25," Narco says. It is the firm's answer to claims made for a low-cost lightplane Tacan receiver recently announced by a competitor. Although Narco does not say so, Endital appears to have been developed by the sales department.

"Endital combines the best features of all known rho-theta systems plus some others which no one has even dreamed about," Narco's president James Riddle claims. He adds that Endital will "absolutely revolutionize the entire aviation industry."

Highlights of the mythical new device, shown above, include:

• **Automatic translator,** built into communications set, which translates any known foreign language broadcast into clearly understandable English. Narco does not say whether this feature operates on both sides of the Iron Curtain.

• **Radar,** which detects anything ranging from sea gulls to thunderstorms.

• **Full autopilot,** with altitude control and automatic approach coupler.

For automatic cross-country navigation, the pilot merely punches a few buttons to set in his present position and his destination, then sits back and lights up his pipe. When he arrives over his destination, lights flash.

Narco claims it cannot disclose details of how Endital works because of "security reasons so far not determined."

The firm reports that Endital is "well on its way to development and will soon be put on the drawing board. A prototype will be flying later this week, with full production expected the end of next week."

Narco does not, however, say when its revolutionary Endital might be available to private fliers. Private fliers who are presently planning to buy communications or navigation equipment are not urged, even by Narco, to wait.

▶ **Portable Frequency Standard**—National Bureau of Standards has developed a small, portable, high-stability 1mc. frequency standard, reportedly constant to within a few parts in 10 billion per day. NBS Summary Technical Report 1924 gives details.

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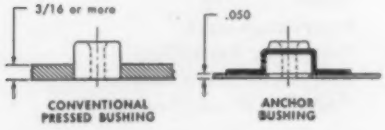

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Drilling holes in instrument panel at Douglas Aircraft Company, Santa Monica.

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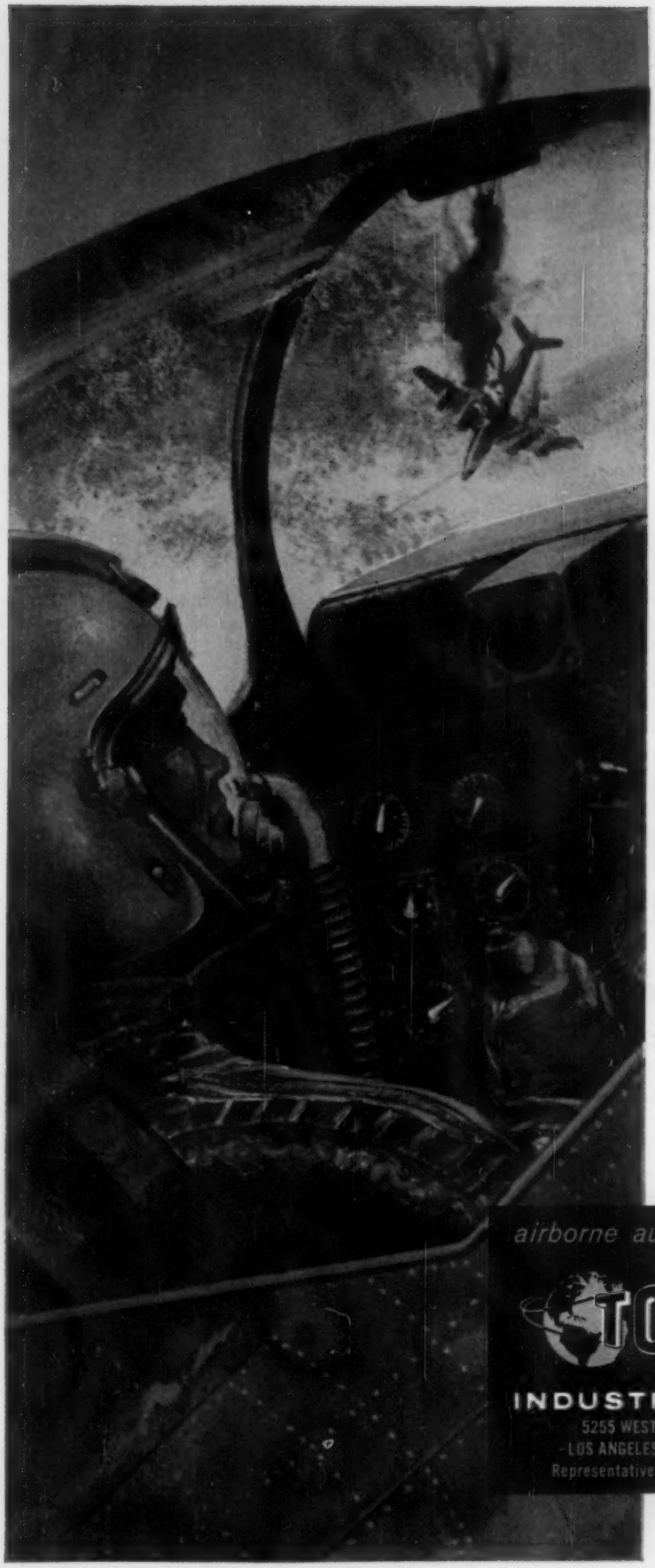

airborne automation for a busy man!

Put yourself in Joe's place for a moment!

Your job is to destroy the target. Your speed is supersonic . . . and so is the enemy's. You must be right the first time because you may have only one chance . . . and your target is shooting back. Watch your power setting, attitude, pressure readings, fuel consumption, Mach number, altitude, G-loading, and a dozen other flight parameters . . . and don't forget you have to find your way home, too.

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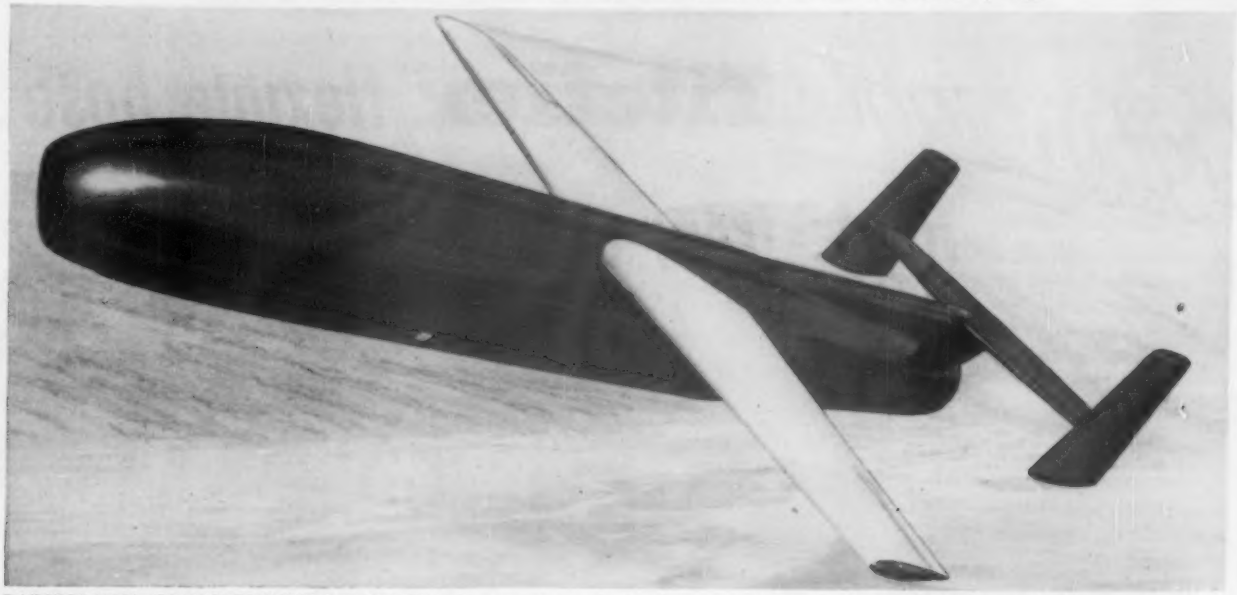
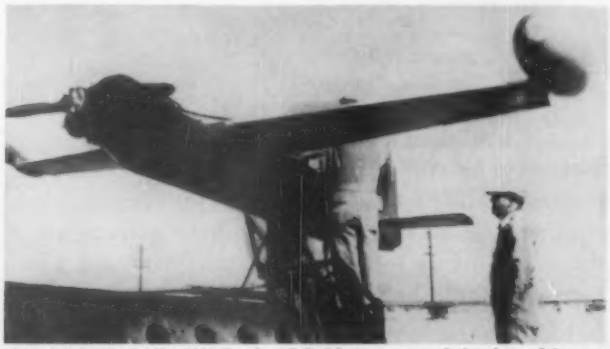


RADIOPLANE's TURBOJET-POWERED YQ-1B is important step in development of company's new Q-4 supersonic drone project.

MODEL OQ-19E TARGET DRONE is equipped with out-of-sight radio control and now is going through tests on Matagorda Island.



ON DRONE CATAPULT, the OQ-19 is prepared for launching at Radioplane's plant. Note wingtip reflectors for radar tracking.

Radioplane Drones Lead to New Missile

By Irving Stone

Van Nuys, Calif.—First flight tests of Radioplane Co.'s guided missile system, believed to be built around a turbojet-powered airframe, have been made at USAF's Holloman Air Development Center.

A second major project—the XQ-4 supersonic drone—is scheduled for flight test later this year by the company.

Both projects reflect Radioplane's 15-year experience in the design, development, production and testing of more than 40,000 piston-engined drones.

Keyed to this advanced missile and target drone work are programs on deceleration and recovery systems, and equipment testing on a company-developed highspeed sled, similar to those developed by Radioplane's parent company, Northrop Aircraft, Inc.

The firm's guided missile project is an Air Force research and development program in which the company is responsible for overall planning of the weapon system, layout of system elements, determination of performance of these elements, assignment of work to its own shop or subcontractors, assembly of the finished model, and factory and field tests to gather data for subsequent models. The company will make no statement on configuration or makeup of the missile.

Flight tests to date have included evaluation of such components as the airframe itself, flight controls, mechanical handling and launching equipment, and avionic checkout devices.

Future flights are to encompass evaluation of advanced models of avionic subsystems which are now under development for inclusion in proposed production versions of the missile.

Since the bulk of Radioplane's work has been concerned with pioneering in the field of pilotless aircraft of conventional design, it may logically be deduced that the missile is an aircraft-type configuration.

In the past, in addition to piston engine-propeller power for drones, Radioplane has applied pulsejet, turbojet and rocket power to drones and test vehicles. Best known of these is the YQ-1B, a turbojet-powered target drone in the high subsonic regime. It may be safely assumed that the missile program, being a step beyond the YQ-1B work, also has relied on turbojet power in the developmental progression.

Radioplane is applying its know-how in recovery systems to its missile development, so that in flight test evaluation the missiles have been recovered repeatedly.

This has afforded data otherwise un-

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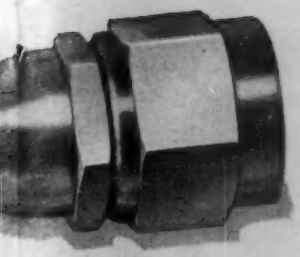

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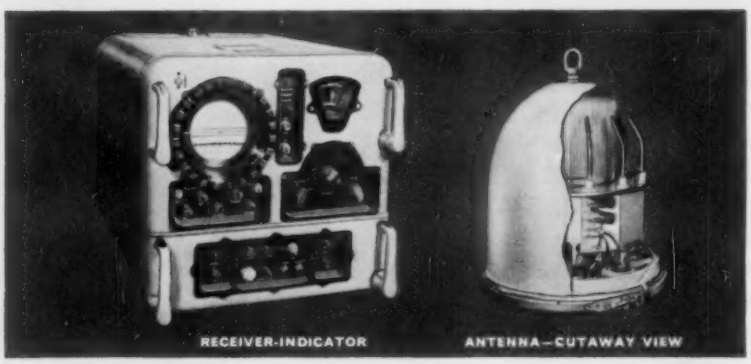

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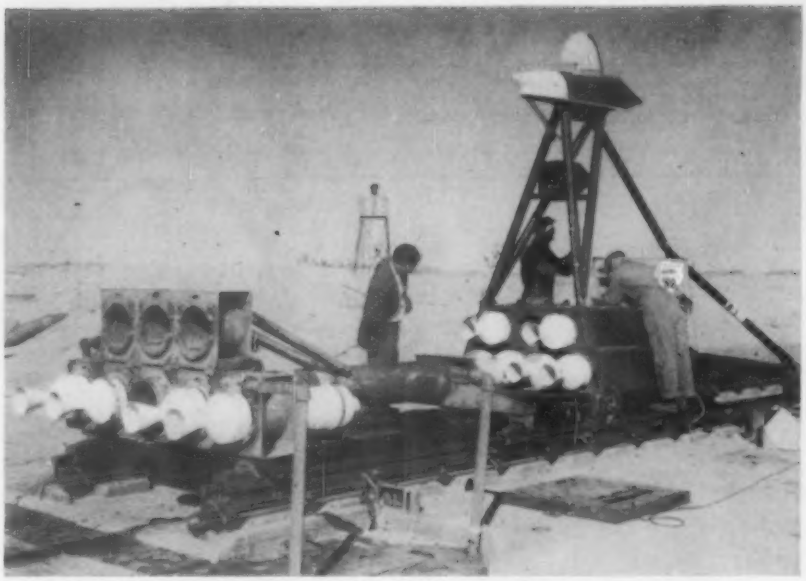
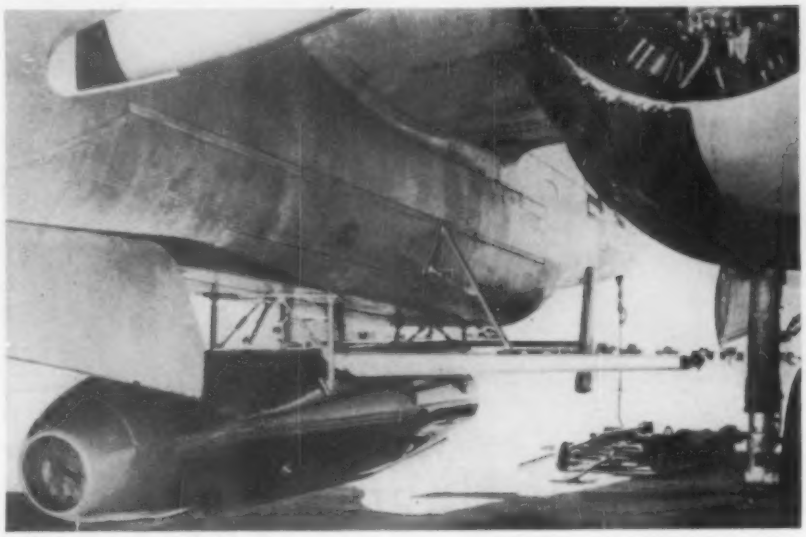
The target drone's sole function is to simulate in every detail an enemy aircraft. This means that studies and designs of this type of aerial target must be constantly refined to anticipate the best a possible enemy could mount against us.

So long as it is necessary to have radio-controlled targets, Radioplane will be a factor in this work. We have a group of electronics, guidance and aerodynamic engineers who have devoted their entire careers to this art. They have had more experience than any other group in the U. S. in the field of pilotless aircraft.

With this background of experience in the target drone field, it is only natural that the company should become an increasing factor in the guided missile field.—*Whitley C. Collins, president of Radioplane Co.*



RADIOPLANE ROCKET SLED is prepared for tests that have reached 1,100 mph.



YQ-1B TARGET DRONE sits in launch rack extended from bomb bay of B-26 carrier.

obtainable from impacted missiles, also is leading to important refinements in the company's developments in the deceleration and recovery devices.

Drone Design

Radioplane's very high speed target drone system is an Air Force development project which has been in effect a little over a year.

Contract was obtained in industry competition with such contenders as North American Aviation, Lockheed, Ryan, Hughes, Goodyear, and Avco's Lycoming Division.

While the drone has not been officially identified, its designation has been reported to be the XQ-4. It is targeted to fly before the end of the year, AVIATION WEEK has learned from a reliable source.

Development engineering inspection for Wright Air Development Center was conducted in January, while formal USAF mockup inspection was held in April.

While there has been no specific information on the aim of this drone project, the vehicle probably is being developed as a supersonic type as the result of an extreme need for an aerial target with enough speed to constitute a realistic challenge for the capabilities of today's missiles.

It is a simple philosophy that there's no point in pitting a supersonic missile against a relatively slow-moving target drone—some equality between the two is needed.

Also, economy is involved with a supersonic drone, since it eliminates the need for converting a fast combat-type plane to drone status.

It also may be deduced that development of Radioplane's very high speed drone will require the introduction of a new breed of pilotless-aircraft controllers to bring the fast target into play against super-speed attacking weapons. It will mean training the new control personnel in the use of new equipment for split-second drone maneuvers in the face of requirements for greater distances covered in much less time than previously experienced.

Drone Development

Development of the new target drone system at Radioplane involves:

- **The vehicle itself.**
- **Air support equipment**—such items as the air launch system and associated hardware.
- **Ground support equipment**—checkout, ground handling, and ground launch.
- **Training aids**—proposals for an AF training program for utilization of the drone system.

As prime contractor, Radioplane has subcontracted the flight control system and some other specialized equipment to experienced companies. A considerable amount of this equipment is not in the "off-the-shelf" category.

There's no word on the type of powerplant that has been selected, but here again it is likely that it will be a turbojet engine in view of the company's past experience with this type of unit in its drone development.

Recovery Systems

Work on deceleration and recovery systems in Radioplane's Aero-Mechanical Research Laboratory is concerned largely with parachutes. Most of the work in recovery systems is directed to drone and development-missile letdown.

A typical example of present develop-

By Unanimous Agreement

These men, representing the armed services, discuss, debate—and finally agree upon a course of action. By so doing, they demonstrate a fact that is basic in the thinking of RCA: no matter what the equipment may be—atomic, electronic, chemical or structural—it takes *a man* to run it! There is no substitute for the human brain. The man always far outvalues the equipment he uses. Without him, it is meaningless.

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RCA

GOVERNMENT DEPARTMENT
RADIO CORPORATION of AMERICA
ENGINEERING PRODUCTS DIVISION CAMDEN, N.J.

ment in deceleration and recovery technique is a multi-stage chute system now being used in connection with pilotless aircraft and some experimental missiles.

This chute system may be initiated to operate through a series of conditions such as command, failure of engine power, loss of guidance signal, or proximity to terrain.

Applied to a drone or missile, the vehicle is first decelerated by chute down to a safe value, when the main recovery chute is deployed.

Upon reaching the ground, the vehicle has its impact cushioned by an automatically inflated air bag system to reduce chance of damage to structure or instrumentation. At the same time, the main recovery chute is automatically released from the vehicle to prevent dragging of the latter in high wind conditions.

In the event of over-water recovery, the impact bag system becomes the flotation gear for the vehicle.

In the area of development work related to deceleration systems only, a project is underway utilizing a chute as a means of slowing an F-94 in various flight attitudes at various speeds.

Another development of the lab is the Rotofoil chute, which is reported to have good application for a wide range of deceleration and stabilizing jobs, including material delivery.

This chute rotates in the manner of a fabric windmill to provide high drag and stability. One of the units, weighing about 10 oz., could stabilize a falling object weighing up to 4,000 lb., it is reported.

This stabilizing effect could be used to eliminate fins on instrumented pods, bombs and other devices.

Radioplane presently is fabricating all of its experimental deceleration and recovery chutes and related equipment such as deployment bags, harnesses, risers, etc.

The lab's deceleration and recovery studies not only are being applied to present-day aircraft, drones and missiles, but are being projected to meet expected future requirements.

Fastest Sled

In connection with the equipment testing program, Radioplane has developed a two-stage rocket-powered sled which has hit a peak speed of about 1,100 mph.—about 60 mph. faster than the previous record on the 10,000-ft. track at Edwards AFB, where the sled is located.

The vehicle, stopped by the Northrop-developed water braking system on the Edwards track, is the first to attain speeds of more than 1,000 mph. and be recovered intact. Previous record was held by a sled which was expended during the run.

Weighing about 4,300 lb., the sled has a chisel-shaped sheet metal nose, and a welded tubular superstructure for mounting test equipment. The vehicle's booster stage has eight rockets, basic motor has seven. Peak speed has been reached in less than 5 sec. from the start.

Radioplane won't specify what equipment is being proved on the sled, but considering its speed, it is almost certain that the equipment is being projected for supersonic service—in missiles and drones.

Production Drones

Radioplane's principal manufacturing effort now is directed at the production of the OQ-19 subsonic target drone, the backbone of the company's growth.

This drone is a propeller-driven configuration powered by a two-cycle, four-cylinder, 72-hp. McCulloch motor. Wing span is about 12 ft., weight about 350 lb. Duration is about 90 min.

Essentially used for anti-aircraft gunnery and Air Force flexible gunnery training, the drone can climb 2,400 fpm. at sea level to a service ceiling of about 23,000 ft. Speed is in excess of 200 knots.

Two versions of the OQ-19 are being built in quantity—the B and the D models. The D model is equipped with

RADIO-CONTROLLED DRONES are assembled in Radioplane's plant at Van Nuys.

RADIOPLANE PRODUCTION FACILITIES are shown in this aerial view of the factory.

IMPROVED DESIGN VICKERS PUMPS

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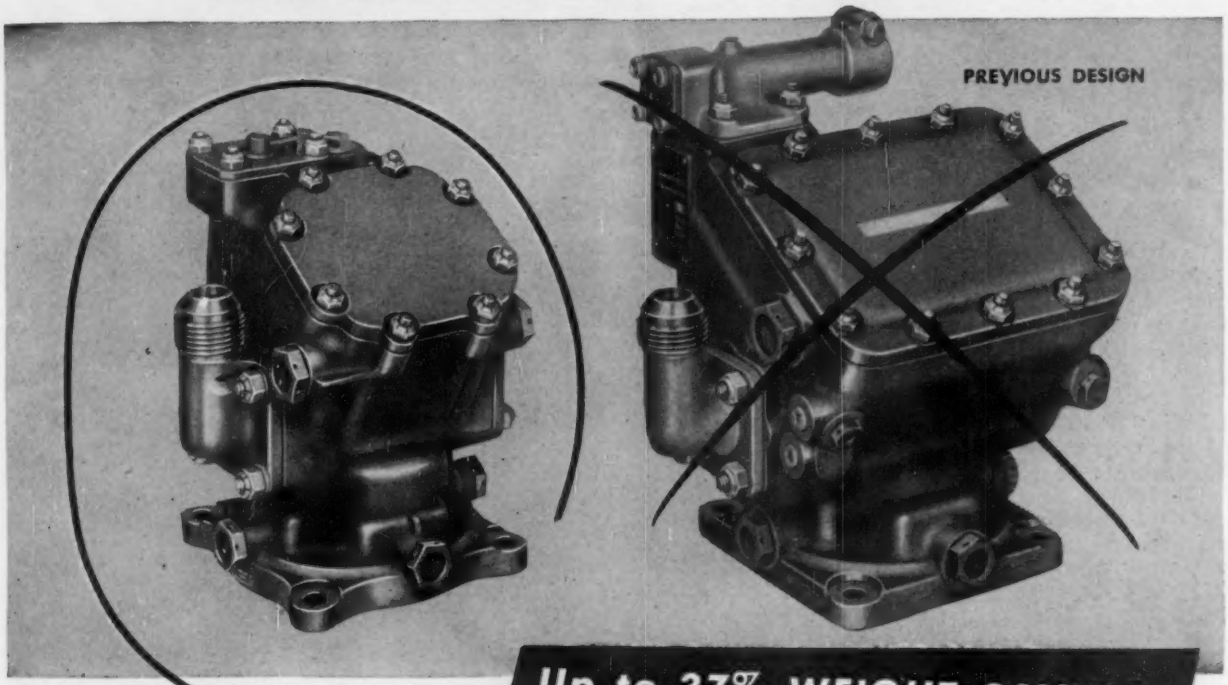

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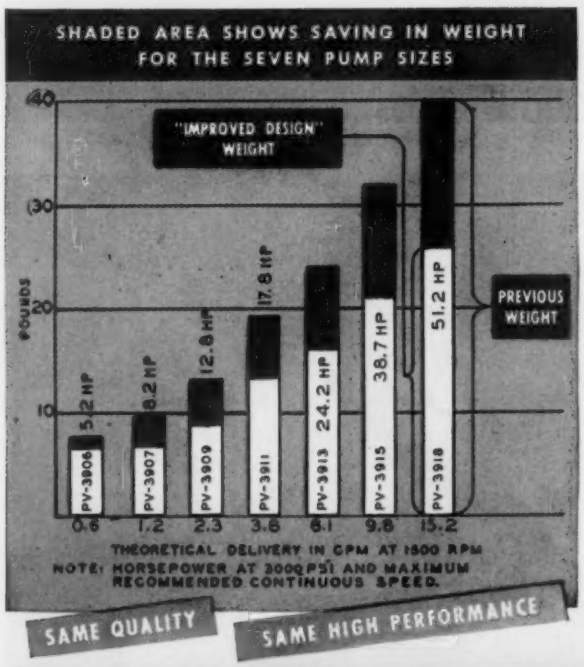

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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

in-sight radio-controlled guidance. The B model, which constitutes the greatest portion of the 1955 production load, incorporates a Radioplane-developed autopilot and is followed on a radar plotting board by an out-of-sight controller.

Another version of the OQ-19, the E model, now is under test at Matagorda Island, off the Texas coast. This out-of-sight radio-controlled model is powered with a six-cylinder engine, has Radioplane's autopilot, and corner reflectors used to increase the radar reflectivity of what otherwise might be a very small pip on the radarscope.

The reflectors are tip-mounted intermeshing metal screens forming quadrants, which are contained in a plastic housing.

Navy Bureau of Aeronautics is flight-testing the XKD2R-4, another version of the OQ-19E.

Two other OQ-19 types, the XM-20 and XM-23E1, have been undergoing tests for Army Ordnance at White Sands Proving Grounds, N. M., and at Fort Bliss, Tex.

Company's Progress

Radioplane's extensive experience in the field of pilotless aircraft stems back to 1938, the year it was organized. Whitley C. Collins, one of the founders of the company, became its president, still serves in this capacity. Under his leadership, the company has produced about 40,000 target drones—most of them during World War II and thereafter.

Collins became a director of Northrop Aircraft, Inc., in 1952, when it acquired 100% of Radioplane's stock. He was elected Northrop's president in May 1954.

Thus, he skippers both Radioplane and Northrop.

• **Radioplane's first craft was the RP-1.** It cruised at 50 mph., with power from a Righter 2½-hp., two-cycle, two-cylinder engine. Construction of the plane featured balsa and plywood. Wing span was 9 ft.

• **Second craft, the RP-2,** was finished in March 1939. This experimental model was constructed with a square basswood fuselage.

• **Third experimental target plane, the RP-3,** was finished in November 1939 It had a welded steel tubular fuselage, was fitted with a recovery chute.

• **In 1940, three RP-4 target drones** were delivered to the Army Air Corps. These planes cruised at about 60 mph., had contra-rotating props, and tricycle gear.

• **First production target drone, RP-5,** came off the assembly line in June 1941. Air Corps accepted it as model OQ-2. Speed was 85 mph. Modifications brought a triangular fuselage, tail skid,

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Al-Fin is used on other passenger car, truck and motorcycle parts such as brake drums, pistons, cylinder barrels and sleeve bearings; in aviation missile, airframe and engine construction. It is used by 18 domestic licensees and 17 in nine other countries.

AL-FIN

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West Coast Sales: 10500 Magnolia Blvd., N. Hollywood, Calif. • Export Sales & Service: Bendix International Division, 205 E. 42nd St., New York 17, N.Y., U.S.A.
Canadian Distributor: Aviation Electric, 200 Laurentian Blvd., Montreal, Quebec

drag bracing. Righter engine developed 6½ hp.

• **Refined version of the OQ-2** went into production in May 1942. This became the OQ-2A, was manufactured for the Navy as its TDD-1.

• **OQ-3 (Navy's TDD-2)** went into production in 1943. It cruised at 103 mph., had an 8-hp. engine.

• **Completely new drone, the RP-8,** was developed in 1944. This emerged as production model OQ-14 (Navy's TDD-3). It cruised at 141 mph., powered by Righter 20-hp. engine.

• **Production output in 1944** reached 50 to 100 OQ-14 target drones per day, with a staff of 250 employes.

• **RP-15 experimental drone** showed a crusing speed of 195 mph. in November 1944. Engine was a two-cycle, four-cylinder horizontally opposed McCulloch powerplant.

• **Speed was boosted to 225 mph.** in development tests of another drone, the RP-19, using the same McCulloch engine. This plane became the first Air Force model OQ-19 aerial target (Navy model KD2R-1) and has been subjected to constant engineering and cost improvement since 1944. Present production series OQ-19 has had engine power boosted to 72 hp., has flotation equipment, and all components waterproofed.

• **Pulsejet-powered XQ-1,** developed for the Air Force, was brought out in 1950, flew that year. A modified version flew in 1951.

• **Turbojet-powered XQ-1A and YQ-1B** followed. The latter drone was first flown in 1953.

Various configurations of the YQ-1B have made numerous free flights. Airframe is of aluminum alloy construction, with straight wing and H-tail. Out-of-sight control can be accomplished at distances in excess of 30 mi. from the control station.

YQ-1B development logically has led to Radioplane's activity in the advanced field of guided missiles and high-speed target drones.

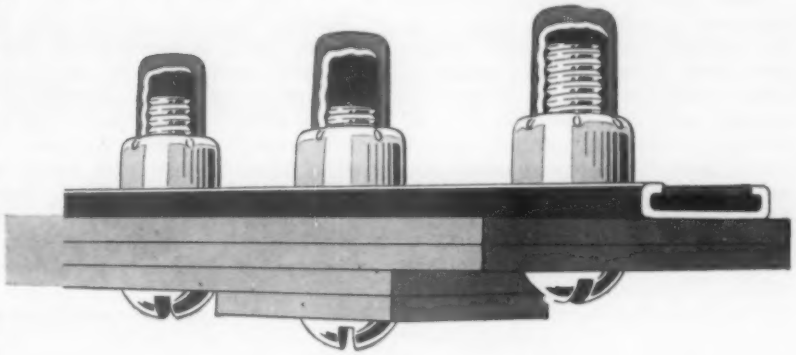
Company force today is approximately 1,400. Covered area is about 200,000 sq. ft. Original manufacturing space was 979 sq. ft.

Aircraft Firms in Atomic Trade Fair

Two airframe companies—Glenn L. Martin and North American Aviation—have reserved exhibit space in the first U. S. Trade Fair of the Atomic Industry, to be held Sept. 26-30 in Washington, D. C. Another exhibitor will be General Dynamics Corp.

Held in conjunction with the annual fall meeting of the Atomic Industrial Forum and sessions of the American

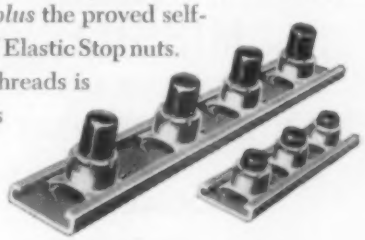
FASTENER PROBLEM



Protecting a constant length bolt when material thicknesses vary

Wherever protruding bolt ends may abrade or chafe critical parts like fuel cells and wiring; or rip clothing and harm personnel, some protection is called for. The problem is further complicated when economy or mass production requirements demand the use of a single constant bolt length even though varying material thicknesses will result in a corresponding variation of bolt protrusion.

ESNA NK4G1 extra high nylon cap gang channel nuts accept variations of approximately ¼" in bolt protrusion. Within that range bolt lengths and nut style may be standardized to increase production flexibility. The red elastic collar that locks the nut to the bolt is an integral part of the NK4G1. You get positive protection against exposed bolt ends . . . improved appearance . . . immediate identification . . . *plus* the proved self-locking performance of vibration-proof Elastic Stop nuts. Liquid or gas seepage along the bolt threads is effectively sealed. Other cap heights available in both metal and nylon.



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Elastic Stop Nut Corporation of America
Dept. N84-725, 2330 Vauxhall Road, Union, New Jersey

Please send me the following free fastener information:

☐ Details on ESNA NK4G1 High Nylon Cap Nuts

☐ Here is a drawing of our product. What self-locking fastener would you suggest?

Name_____ Title_____

Firm_____

Street_____

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Nuclear Society, the fair follows closely on the United Nations International Atomic Energy Conference in Geneva.

About 70 industrial and governmental organizations will exhibit displays in the fields of nuclear reactor design, component equipment and materials. Other exhibits will cover design engineering, medical and research reactors, package powerplants, control systems, reactor materials, instrumentation, construction techniques, shielding materials, handling devices and consultant services.

Fair is under the auspices of the Atomic Industrial Forum. Address: 260 Madison Ave., New York 16, N. Y.

Molten Salt Bath Heat-Treats Rivets

Tel-Aviv—An electrical-chemical device for the heat treatment of rivets and small brackets—to be substituted for conventional heat treatment—has been invented by Don Shapiro, an engineer with El Al Israel Airlines.

The device consists of a bath containing sodium nitrate and other salts heated to the molten state and brought to the necessary temperature by heating elements. It is claimed to cut costs and time considerably.

The rivets or brackets are placed in containers which are immersed in the molten salt. Two thermostats control the temperature within the desired limits, while two thermocouples connected to gages provide a constant visual indication of the salt and rivet temperature. Because the rivets or brackets are not in direct contact with the molten salt, the danger of corrosion is eliminated.

Apart from the heater elements, thermocouples, thermostats and salt, only scrap material is utilized.

Experimental Foam Chemicals Available

Two experimental polyesters for use in making rigid and flexible polyurethane foams are offered to selected manufacturers for evaluation by Reichhold Chemicals, Inc.

The rigid foams can be used to fill and strengthen aircraft and missile structures. The flexible products have applications which include mattresses, pillows, carpet underlays and seat cushions.

Inquiries may be directed to D. G. Patterson, sales manager and technical director, Polyester Resin Division, Reichhold Chemicals, Inc., 525 North Broadway, White Plains, N. Y.

Plastic 'Brick' for Emergency Shelter

Small igloo-shaped emergency shelters for downed flyers, barracks, hangars, and large domes to cover radar installations are some of the possible future applications of "pneumatic bricks," a new insulating building material developed at the University of Illinois.

The bricks, invented jointly by Prof. Ambrose C. Richardson of the university's architecture department and Maj. George W. McCauley, USAF, are extremely lightweight triangular plastic pillows kept firm by air at low pressure.

Utility Metal Gets Fast Writeoff for $503,259

Utility Metal Products, Inc., Pasedena, Calif., has been granted a $503,259 certificate of necessity by Office of Defense Mobilization for a military aircraft parts facility with 55% allowed for rapid tax amortization.

Other certificates issues include:

Sylvania Electronic Products, Inc., Electronic Systems Division, Buffalo, N. Y., research and development of military aircraft, $44,175 certified with 65% allowed.

Curtiss-Wright Corp., Propeller Division, Caldwell, N. J., military aircraft parts, $96,513 certified with 65% allowed.

Boeing Airplane Co., Seattle, Wash., military aircraft, $404,925 certified with 65% allowed.

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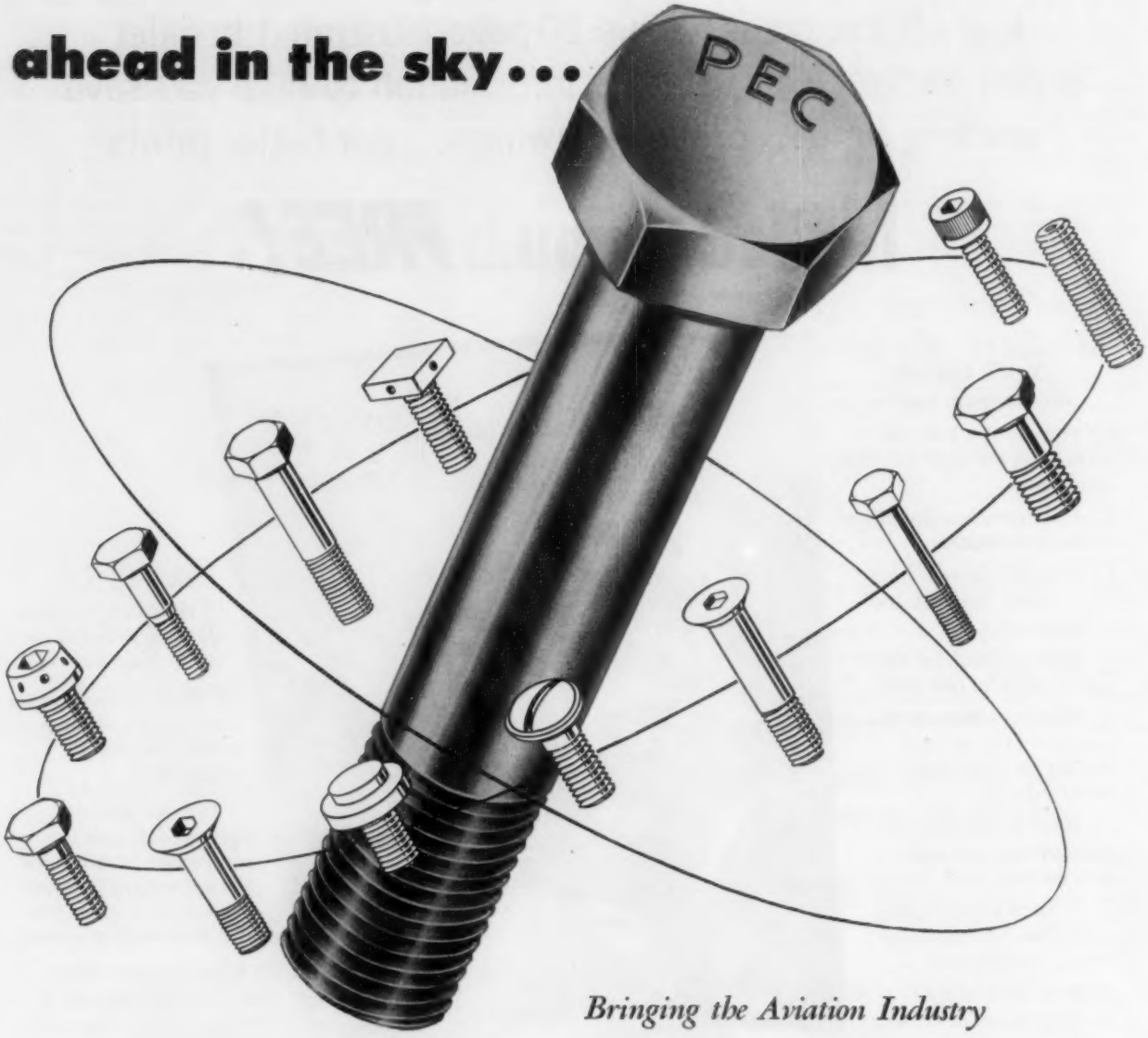

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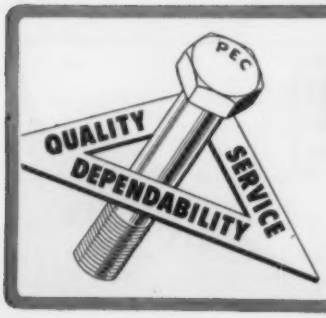

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USAF Contracts

Following is a list of recent contracts announced by the United States Air Force.

AiResearch Mfg. Co., 9851-9951 Sepulveda Blvd., Los Angeles, Calif., thermostat, 200 ea., $35,620.

Pacific Division, Bendix Aviation Corp., 11600 Sherman Way, North Hollywood, Calif., modification kit, Bendix P/N, 2,300 ea., $134,064; waveguide, 230 ea., modification kits, 42 ea., $44,744.

Bendix Radio Div., Bendix Aviation Corp., Towson 4, Md., receiver, subassy., 300 ea., $72,315; dynamotor plate, 60 ea., $72,315.

General Electric Co., Schenectady, N. Y., switch, inertia, 720 ea., $87,933.

Alloy Industries, 2211 East Firestone Blvd., Los Angeles 2, Calif., switch, sensitive, SPDT, 4,000 ea., $58,600.

Sperry Corp., Sperry Gyroscope Co., Great Neck, N. Y., analyzer, ignition and vibration, aircraft reciprocating engine, 29 ea., $28,120.

Scintilla Division, Bendix Aviation Corp., Sherman Ave., N. Y., N. Y., switch assy., 500 ea., $28,120.

Bomac Laboratories, Inc., Salem Road, Beverly, Mass., electron tube, 8,000 ea., $74,000; miscellaneous spare parts, $66,310.

Philco Corp., Government & Industrial Div., 4700 Wissahickson Drive, Philadelphia 44, Pa., control indicator subassy., 50 ea., 50 ea., 70 ea., 55 ea., $274,390; ring, elec. cont., 100 ea., gear, spur, plain, 100 ea., 100 ea., gasket, sponge, 200 ea., gear, spur, plain, 100 ea., 100 ea., 100 ea., generator, 40 ea., base, mfg., 70 ea., bar, shorting, transm., drive, elevation subassy., 50 ea., reflector, antenna, $274,390.

N. Y. Air Brake Co., Kinney Manufacturing Div., 3529 Washington St., Boston, Mass., pump, vacuum, high, single stage, 10 ea., $30,312.

El-Tronics, Inc., Philadelphia 23, Pa., audio oscillators, 1,210 ea., $311,759.

Raytheon Manufacturing Co., Power Tube Div., Waltham, 54, Mass., tube, electron, magnetron, 264 ea., 382 ea., $539,860.

American Platinum Works, Newark, N. J., silver cyanide, high purity, for heavy duty silver plating, 100 oz. drum, 80.5 min. assay, 17,700 oz., $48,320.

Bradford Machine Tool Co., Cincinnati, Ohio, lathe, engine, floor mounted, solid bed, general purpose, 16" rated swing, 54" between centers, 19 ea., $208,628.

Spencer Turbine Co., Hartford 6, Conn., cleaner, industrial type, portable, 400 cu. in. cap., 62 ea., cleaner, vacuum, electric, portable, 242 ea., $106,879.

Radio Corp. of America, Camden 2, N. J., absorber, 5,947 ea., bar, 1,833 ea., block, 550 ea., button, 305 ea., 16 ea., clamp 434 ea., connector, 120 ea., coupling, 209 ea., gear assy., 1,098 ea., insulator, 62 ea., mounting, 331 ea., plate, 145 ea., post, 1,452 ea., probe, 8 ea., screw, 7,698 ea., 573 ea., 426 ea., stud, 819 ea., 576 ea., 100 ea., clamp, 513 ea., $39,933.

G & W Electrical Contractor, Jacksonville, Fla., installation of two 60 kw. and two 100 kw. diesel generator sets at transmitter site at MacDill AFB, Tampa, Fla., $29,785.

Portable-Cable Machine Co., Syracuse, 8, N. Y., saw, portable, 8 inch blade 2⅝ inch min. depth of cut, grip type handle, 636 ea., $37,206.

Lincoln Electric Co., Cleveland, Ohio, welder, arc, portable, 76 ea., $31,957.

Dake Corp., Grand Haven, Mich., press, universal hyd. 36" maximum opening between ram and bed, 6¼" travel of ram, 36" between columns, 100 ton rated capacity, 86 ea., $48,300.

Revere Corp. of America, Wallingford, Conn., weighing units, electric, aircraft, 400,000 lb. capacity, 58 ea., $188,722.

Eastman Kodak Co., Rochester 4, N. Y., arm assy. detent, 156 ea., arm and detent, 34 ea., arm assy., rotating, 55 ea., block, 85 ea., eyeguard and bellows assy., 66 ea., eyeguard assy., 25 ea., gasket "O" ring, 131 ea., indicator, bombing, 551 ea., spool assy., 121 ea., switch assy., 103 ea., switch assy., phase lat., tube joining, 38 ea., $194,023.

Cornell University, Ithaca, N. Y., continuation of investigation of atomic phe-

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Continental's continuing interest in its product, after the sale, makes a big reduction in the cost of plane ownership and use. Continental aircraft engines are not only built to absorb their full share of punishment, but backed with the kind of service that keeps them running year after year. When major overhaul time rolls round, the owner can replace his engine with a factory-remanufactured power plant—back to zero hours, and with factory new engine guarantee—at very low fixed cost and with virtually no dead time. Continental's Factory Remanufacturing Plan is one more in a long list of reasons underlying pilot preference for planes with Continental power.

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Aircraft Engine Division
MUSKEGON, MICHIGAN

nomena occurring on or near the surface of solids particularly metals and alloys, $76,330.

Pennsylvania State University, State College, Pa., continuation of a study of metal surfaces by the field emission microscope, $38,911.

Regents of the University of Michigan, Ann Arbor, Mich., continuation of a theoretical study of brillouin zones with special regard to the appearance of energy gaps, $26,350; continuation of electron diffraction investigation of photoconductivity of crystalline lead sulfide surfaces, $28,000.

Trustees of Princeton University, Princeton, N. J., continuation of the analytical research group, $40,000.

University of Maryland, College Park, Md., continuation of investigation of solid state theory, $64,480.

Westinghouse Electric Corp., Dayton, Ohio, generators, 124 ea., $38,440.

Allen B. DuMont Labs., Inc., Clifton, N. J., amplifier, 522 ea., control parameter selector, 666 ea., control, interval type F-3, 131 ea., $698,158.

Republic Aviation Corp., Farmingdale, L. I., New York, 230 gallon tanks, 450 gallon tanks, $2,498,182; modification of 3 mobile training units, $135,607.

General Motors Corp., Allison Div., Indianapolis 6, Ind., special tools and GHE, $400,000.

Jack & Heintz, Inc., Cleveland 1, Ohio, motor-generators and data, $274,029.

Remler Co., Ltd., San Francisco, Calif., spare parts and provisioning procedure, $42,000.

Boeing Airplane Co., Seattle, Wash., jet tanker aircraft, special tools, trng. items, $15,000,000.

Olympic Radio & Television, Inc., Long Island City 1, N. Y., components for AN/APN-76 spare parts, $115,485.

Red Bank Division, Bendix Aviation Corp., Eatontown, N. J., generator, 100 ea., $29,520.

Sperry Gyroscope Co., Inc., Sperry Corp., Great Neck, N. Y., D-1 motor and drive assy., 20 ea., D-2 motor & drive assy., 96 ea., C-1 drum and bracket assy., 190 ea., $204,267.

Andrea Radio Corp., Long Island City 1, N. Y., components of AN/AIC-10 interphone system, $880,595.

Bell and Howell, Chicago 45, Ill., spare parts, $34,001.

Lear, Inc., Grand Rapids, Mich., indicator, 220 ea., 150 ea., control, 220 ea., $892,340; indicator, 69 ea., 4 ea., 204 ea., $202,509.

Weston Electrical Instrument Corp., Newark 5, New Jersey, indicators, $476,764.

Delta Air Lines, Inc., Atlanta, Ga., purchase, maintenance, storage, inspection, and receipt of group B Parts for CRAF, $54,962.

Jack & Heintz, Inc., Cleveland, O., generators, aircraft, 408 ea., $142,178.

Aero Design & Engineering Co., Tulakes, Okla., L-26B airplanes, $1,178,623.

Wilding Picture Productions, Inc., Chicago 40, Ill., production of motion picture project 19169, $63,780.

Eclipse Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., transmitters, 431 ea., $105,077.

Radio Corp. of America, Engineering Products Div., Camden 2, N. J., adapters, $180,000.

Jack & Heintz, Inc., Cleveland 1, Ohio, generators, $277,825.

Kearfoft Co., Inc., Clifton, N. J., loop assemblies, indicators, $1,176,174.

Elcor, Inc., Chicago, Ill., 100-va. inverters, $69,888.

Ward-LaFrance Truck Corp., Elmira, N. Y., crash fire trucks, 138 ea., $12,055,163.

Lockheed Aircraft Corp., Burbank, Calif., T-33A aircraft, spare parts, special tools, 95 ea., $3,536,000.

Kearfoft Co., Inc., Little Falls, N. J., special tools and test equipment, $248,920.

Douglas Aircraft Co., Inc., Long Beach, Calif., spares for acft., $3,146,900.

Chicago Aerial Industries, Inc., Melrose Pk., Ill., component parts, $40,764.

Cook Electric Co., 2700 Southport Ave., Chicago, Ill., switches, press, SPDT, 700 ea., $48,020.

General Riveters, Inc., Electro Mechanical Div., 785 Hertel Ave., Buffalo 7, N. Y., clutches, magnetic, 575 ea., $34,298.

Pan Electronics Corp., 901 West Peachtree, Atlanta, Ga., crystal units, CR 18U in HC-6/U metal holder, 52,864 ea., $45,991.

Sperry Gyroscope Co., Great Neck, N. Y., testers, flight direction and system, type A1 and A2, 168 ea., $203,733.

American Phenolic Corp., 1830 South 54th Ave., Chicago, Ill., reproducible copy for handbook for operation and service instructions, reproducible copy for illustrated parts breakdown covering set, $43,618.

A. R. F. Products, Inc., 7627 Lake St., River Forest, Ill., generators, pulse, 392 ea., $171,808.

Hewlett Packard Co., 395 Page Mill Road, Palo Alto, Calif., vacuum tube voltmeters, 254 ea., $54,356; test sets for operation in government GI band, 7,125-7,425 mc. freq. range, 136 ea.; test sets, for operation in industrial band, 6,575-6,875 mc freq. range, 8 ea.; test sets for operation in common carrier band, 6,125-6,425 mc. freq. range, 2 ea., $226,241.

General Electric Co., 1 River Road, Schenectady, N. Y., contacts, electrical spring leaf, 198 ea.; relays, armature, 15 ea., 20 ea., 80 ea.; solenoids, 154 ea., $29,026.

General Electric Supply Co., 601 E. Third St., Dayton, Ohio, circuit breakers, 350 ea., $28,136.

General Electric Co., 1 River Road, Schenectady, N. Y., capacitors, 300 ea., 300 ea., 200 ea., $51,167.

Radio Corp. of America, 415 South 5th St., Harrison, N. J., tubes, electron, type 6J4WA, 150,000 ea., $424,500.

Superior Electric Co., 83 Laurel St., Bristol, Conn., transformers, variable power, 696 ea., $32,447.

Raytheon Mfg. Co., Chapel St., Newton 58, Mass., tubes electron, type OB 2WA, 34,000 ea., $59,160.

Bell and Howell Co., 7100 McCormick Rd., Chicago 45, Ill., disposable cassettes loaded with film, 74,500 ea., $93,870.

Bendix Radio Div., Bendix Aviation Corp., Towson 4, Md., Arctic radomes, 3 ea., $63,000, pressurizing equipment, 3 ea.,

This is not an offer of these Securities for sale. The offer is made only by the Prospectus.

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Collins Radio Company

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Price $21.50 per Share

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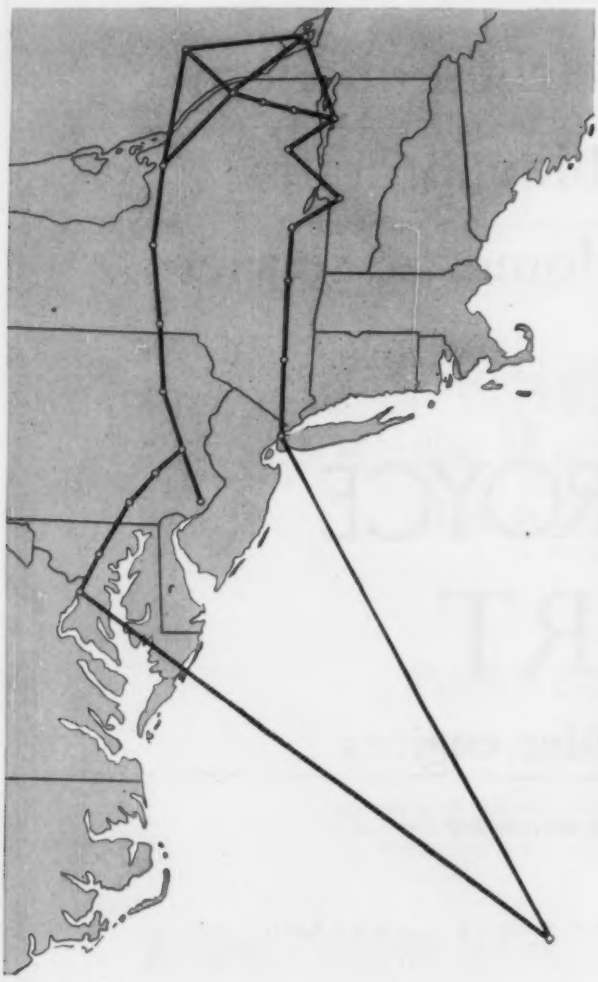

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Dresser-Ideco Co. 875 Michigan Ave., Columbus 8, Ohio, AB-199A/FPS-3, AB-259A/FPS-6 and AB-196/FPS-3 towers, 41 ea., $2,005,020.

Eastman Kodak Co., 343 State St., Rochester 4, N. Y., film, 4,031 rl., 3,321,000 ft., $197,043; 3,725,000 ft., $59,600; 15,742 rl., 9,272,400 ft., $151,550; 9,920 rl., $36,406.

General Aniline and Film Corp., Ansco Div., Binghamton, N. Y., film, 9353 rl., 2,090 pkg., $31,040.

Harvey-Wells Electronics, Inc., Southbridge, Mass., modulators, 125 ea., $118,239.

Technical Material Corp., 700 Fenimore Rd., Mamaronek, N. Y., XFK oscillators, 18 ea., VOX-2 oscillators, 18 ea., TAC-1 antenna tuning units, 18 ea., $54,329.

Charles Beseler Co., 219 S. 18th St., East Orange, N. J., plastic sheets, 12,380 pkg., $67,533.

General Electric Co., Electronics Park, Syracuse, N. Y., radar sets, AN/FPS-6, 36 ea.; radomes, 35 ea.; OA-270/FPS-6, 20 ea., $451,826.

General Electric Co., 1285 Boston Ave., Bridgeport, Conn., cable, 67,000 ft., $33,526.

Haloid Co., 2-20 Haloid St., Rochester 3, N. Y., paper, photographic, 8,950 pkg., $73,902.

Radio Corp. of America, Engineering Div., Front and Cooper St., Camden, N. J., kits, microphone, dynamic, 8,200 ea., $117,309.

National Co., Inc., 61 Sherman St., Malden 48, Mass., atomic primary freq. standards, 2 ea., $70,000.

Westinghouse Electric Corp., 32 North Main St., Dayton, Ohio, reproducible copy for handbook of operation and service and instructions, illustrated parts breakdown, covering twelve (12) pieces of test equipment, $77,890.

Specialty Engineering Co., 79 Clifton Place, Brooklyn 38, N. Y., tuning assy., RF antenna cavity, 17 ea., tuning assy., RF, butterfly, 35 ea., tuning assy., RF antenna, 125 ea., cam assy., tuning, 63 ea., $27,105.

Bendix Radio Div., Bendix Aviation Corp., Baltimore 4, Md., misc. cables, fittings, 125 sets, $250,000.

Eastman Kodak Co., 343 State St., Rochester 4, N. Y., film, 686,000 ft., $39,498.

Munston Mfg. & Service Inc., Beach St., Islip, Long Island, N. Y., control indicators, 1,130 ea., $80,057.

Northern Radio Co., Inc., 143-145 W. 22nd St., New York 11, N. Y., oscillators, 756 ea., $489,888.

Wickers Engineering & Construction, 12th St., & Ferry Ave., Camden 4, N. J., power supplies, full wave, 226 ea., $60,622.

Aluminum & Brass Co., Inc., 120 Church St., Lockport, N. Y., safety disc. assemblies, 200,000 ea., $45,200.

Polan Industries, Inc., P.O. Box 1720, Huntington 19, W. Va., kits, aerial delivery, 127 ea., $124,235.

Reliance Manufacturing Co., 350 Fifth Ave., New York 1, N. Y., harness, snap adapter, 21,600 ea., $45,312.

Technical Operations, Inc., 6 Schouler Court, Arlington 74, Mass., research in chemistry of photographic processes, $99,745.

Research Institute of Temple University, 4150 Henry Ave., Philadelphia 44, study of ultra-high temperatures, $110,761.

University of Maryland, College Park, Md., continuation of mathematical research in the fields of fluid dynamics and elasticity, $32,334.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., indicators, 4,528 ea., 1,098 ea., 837 ea., $2,522,496.

Red Bank Div., Bendix Aviation Corp., Eatontown, N. J., generators, spare parts, $769,930.

Boeing Airplane Co., Seattle Div., Seattle, Wash., test outline for flight simulator engrg. services report for final results, $57,098.

Convair Div., General Dynamics Corp., San Diego, Calif., F-102 aircraft parts, $143,222.

Goodyear Tire & Rubber Co., Akron 16, Ohio, brake assys., 356 ea., wheel assys., 74 ea., $39,185.

Leland Electric Co., Dayton, Ohio, single phase inverters, 1,526 ea., $495,984.

Motorola, Inc., Chicago, Ill., position mark generators, 419 ea., 189 ea., line balancing networks, 67 ea., $563,993.

Navy Contracts

Contracts recently announced by the Navy's Aviation Supply Office, 700 Robbins Ave., Philadelphia 11, are:

Consolidated Engineering Corp., 300 N. Sierra Madre Villa, Pasadena 15, Calif., electronic measuring system components, recording oscillograph, 4 ea., record magazine, 4 ea., galvanometers, 54 ea., 24 ea., System "D" amplification units, 8 ea., $72,561.

Delaware Valley Machinery Inc., 3818 Chestnut St., Philadelphia, Pa., boring, drilling, and milling machine, horizontal, table type, 3" dia. spindle, 1 oz., $38,089; boring, drilling and milling machines, horizontal, table type, 4" dia. spindle, 2 ea., $136,010.

Cook Electric Co., 2700 N. Southport Ave., Chicago, Ill., sensing tubes, runaway shot preventer system, C11 and C7 catapults, 20 ea., 316 ea., $91,724.

Propulsion Research Corp., 1860 Franklin St., Santa Monica, Calif., conduct measurements of dynamic modulus of elasticity values of arresting gear wire rope, MkV arresting gear test installation, derrick supported wire rope specimen test installation, $82,605.

John A. Roebling's Sons Corp., 640 Broad St., Trenton 2, N. J., bridle assemblies, steel, level launching, 2" dia. wire rope, A3D-1 aircraft, $211,145.

Ferracute Machine Co., 429 E. Commerce St., Bridgeton, N. J., press, open-back, inclinable, flywheel type, 45 ton capacity, 5 ea., $43,955.

Diamond Machine Tool Co., 5111 Coffman-Pico Rd., Pico, Calif., press, open-back, inclinable, flywheel type, 35 ton capacity, 15 ea., $43,455.

Spar Engineering and Development, Inc., Paxson and South Aves., Wyncote, Pa., design, development and construction of a 42-channel radiant heating system programmer, $102,469.

Grumman Aircraft Engineering Corp., Bethpage, Long Island, N. Y., flap assys., elevator float and maintenance parts for SA-16A aircraft, $37,366.

G. Felsenthal and Sons, Inc., 3500 N. Kedzie Ave., Chicago, Ill., boards, 2,600 ea., $41,340.

Pacific Div., Bendix Aviation Corp., 11600 Sherman Way, North Hollywood, Calif., actuators, 142 ea., $51,716.

Loral Electronics Corp., 794 E. 140 St., New York, N. Y., frequency meters, 135 ea., $65,485.

Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn., overhaul of propeller blades, 118 ea., $70,651.

McDonnell Aircraft Corp., P. O. Box 516, St. Louis, Mo., maintenance parts, $27,962; ground handling equipment, $30,103.

AiResearch Mfg. Co., 9851-9951 Sepulveda Blvd., Los Angeles, Calif., kits, $102,407; maintenance parts, $245,053; maintenance parts used on power units, maintenance parts, $251,813.

Cleveland Pneumatic Tool Co., 3781 E. 77th St., Cleveland 5, Ohio, maintenance parts, $116,158; actuators and maintenance parts, $86,755.

B. J. Goodrich Co., 500 South Main St., Akron, Ohio, wheel assys., 81 ea., $36,069.

Lear-Romec Div., Lear, Inc., Abbe Rd., Elyria, Ohio, pump and connector assys., $140,029.

Nash Engineering Co., Wilson Ave., South Norwalk, Conn., pumps, $175,320.

Pioneer-Central Div., Bendix Aviation Corp., Davenport, Iowa, maintenance parts used on oxygen equipment, $128,034.

Bendix Products Div., Bendix Aviation Corp., 401 Bendix Dr., South Bend, Ind., maintenance parts used on nose shock struts, $91,163.

Federal Aircraft Works, 3456 North Mississippi Dr., Minneapolis, Minn., ski sets, $46,427.

Permoflux Corp., 4900 W. Grand Ave., Chicago, Ill., headset assys., 2,500 ea., $37,275.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., indicators, 425 ea., $228,650.

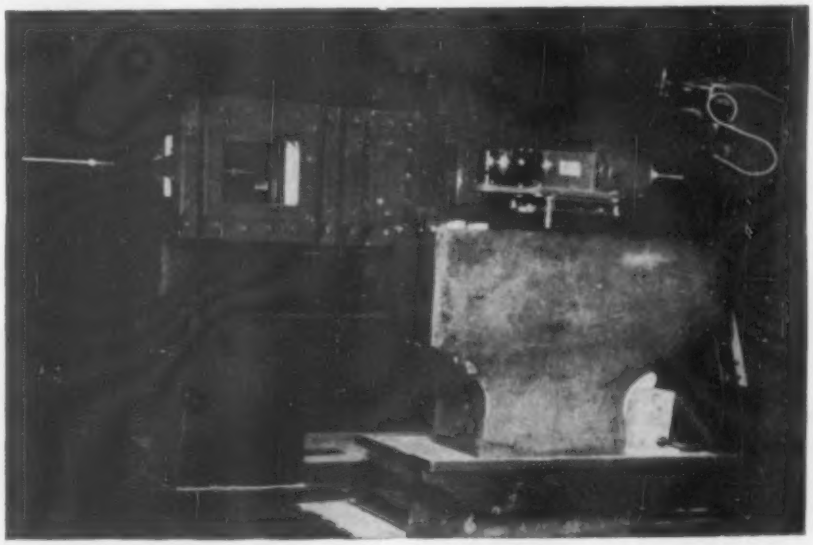
New York Rubber Corp., 100 Park Ave., N. Y. 17, N. Y., pneumatic rafts, $400,117.

Aviation Clothing Co., Inc., 143 Main St., Beacon, N. Y., pneumatic rafts, $804,825.

General Electric Co., 1405 Locust St., Phil., Pa., oscillator filters, $29,120.

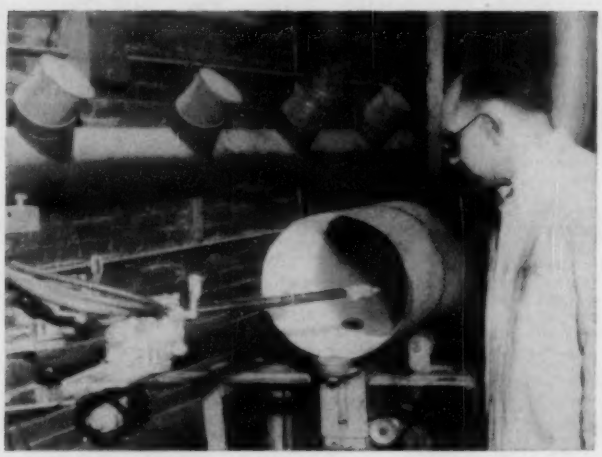
Dalmo Victor Co., 1414 El Camino Real, San Carlos, Calif., pilot's equipment and services, $31,969.

Air Associates, Inc., Teterboro, N. J., T-drive, flex shaft, and parts, $75,631.



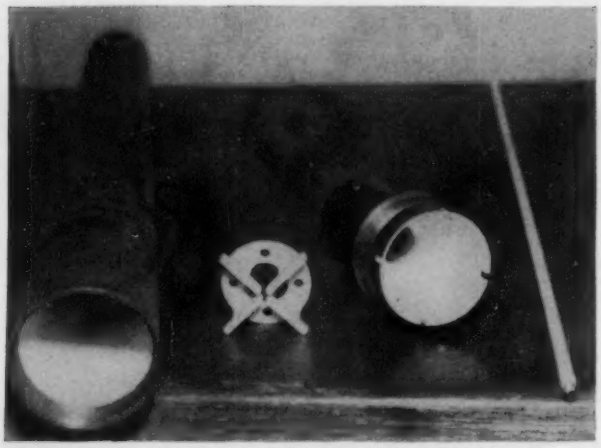
Supersonics in Rome

This new supersonic aerodynamic test facility is part of the equipment built at the School of Aeronautical Engineering in Rome. Financed jointly by the Italian Ministries of Defense and Education and USAF, the tunnel will provide an important test aid for aircraft and missile development. Operating costs are expected to be half those of pre-war runs in the Guidonia supersonic tunnel, the first in the world.

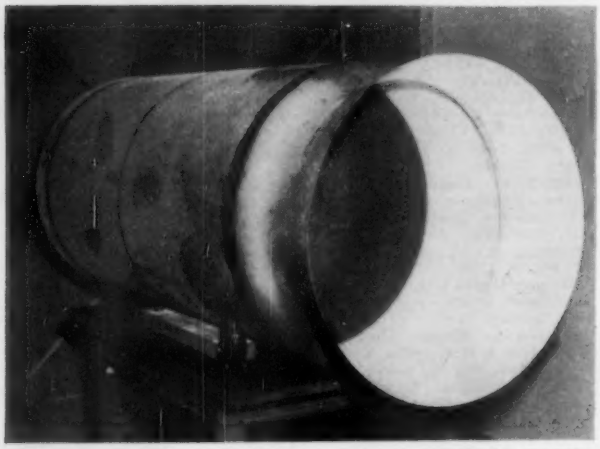


HIGH-TEMPERATURE Norton Rokide coatings protect . . .

BLAST TUBE for cannon in leading-edge cast structure . . .



ROCKET liner and nozzle, jet vanes and motor tierod and . . .



RAMJET combustion chamber and exhaust nozzle by P&WA.

New Materials Build Foundation For Structural Revolution

By David A. Anderton

New developments in materials are pacing the revolution in aircraft structural design.

The formidable task of designing missiles, airplanes and powerplants for the speeds and temperatures of the high supersonic range shows signs of being eased by the many refinements in production and application of materials.

Among the recent additions to the designer's lists:

- **High-strength steels** with tensile limits up near 300,000 psi.
- **Oxide coatings** for protection against 4,500F temperatures.
- **Purified metals** produced by vacuum-melting processes for improved performance.
- **Reinforced plastic** for lightweight protective armor.

Beyond these contemporary uses of developed materials stretches a list of future possibilities. One of these is super-purity metal, now grown in crystalline form in a laboratory. Showing strengths up to 1 million psi., these super-pure crystals of iron may be more than a scientific curiosity before the designers have assimilated the tricks of coping with today's materials.

High-Strength Steels

Production runs of steel parts heat-treated to 280,000 psi. have been common in the aircraft industry for several years.

Menasco Manufacturing Co. has built many landing gear parts from such high-strength steels as SAE X4340 heat-treated to 280,000 psi.; Lockheed Aircraft Corp. has used X4340 steel fittings heat-treated to the same level in many applications.

The traditional use of steel in aircraft structures has been dictated by its strength-weight ratio compared to the ratio of an aluminum structure. Landing gears and major connection fittings comprise the majority of aircraft steel applications in contemporary aircraft, and reflect the load-carrying ability of high-strength steel limited to a small design envelope. Steel wing beams or portions of them, and steel horizontal tail beams have recently been designed and are in use.

Spur to the development of steel alloys have been the increasing strength of aluminum alloys over the past few years. With aluminum at 60,000 psi.,

Twin Coach Aircraft Division is a subcontractor for Boeing, Cessna, Grumman, Martin, North American, Republic

Twin Coach helps Boeing get them in the air

Sooner

The Boeing KC-135 jet tanker-transport is of vital importance to the national defense. The prototype of this airplane—America's first jet transport—is shown above. To produce and deliver KC-135s to the Air Force as rapidly as possible, Boeing enlisted the aid of Twin Coach Aircraft Division as a subcontractor for major airframe assemblies.

This important assignment typifies the way prime contractors rely on Twin Coach Aircraft Division. For Twin is staffed with experienced aircraft specialists to design and build tooling . . . with experienced aircraft production personnel . . . under experienced aircraft supervision and management.

If you have an assembly you're thinking of subcontracting, call Twin Coach Aircraft Division. You'll be secure in the knowledge that your assembly will be built by *aircraft* specialists—by men whose sole aim is to build to specification . . . on schedule . . . at the lowest possible cost.

AA-1431

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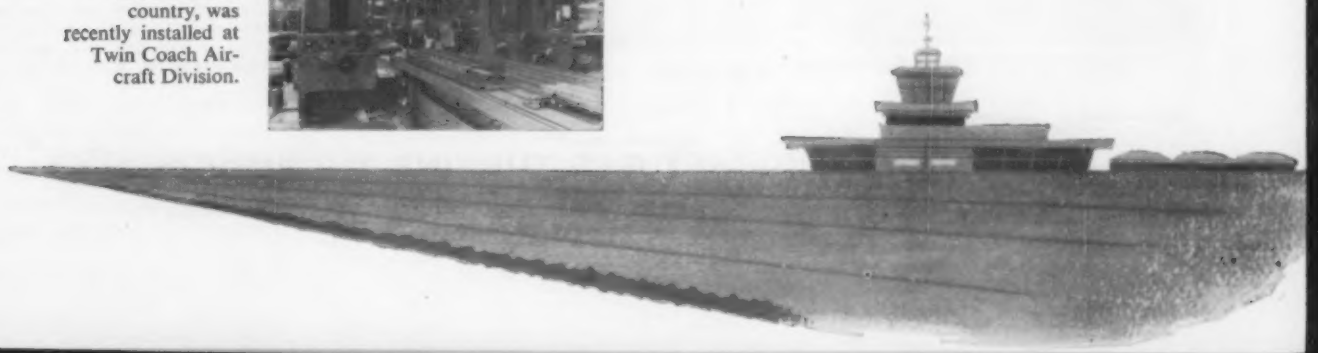
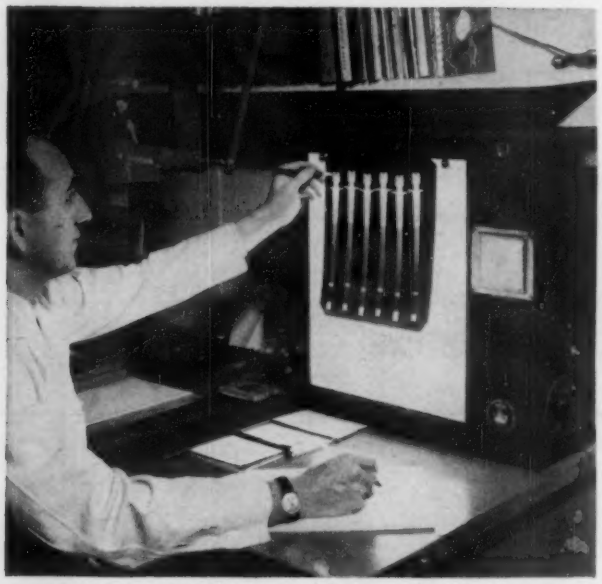
Giant 25-foot Droop & Rein universal planer mill, only one of its kind in the country, was recently installed at Twin Coach Aircraft Division.

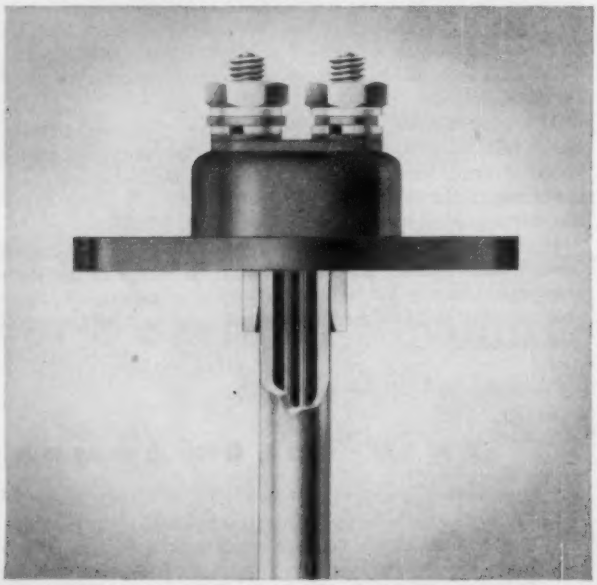


How Fenwal Thermocouples add certainty to modern flight

1. FOR PROTECTION IN FLIGHT Fenwal Thermocouples keep jet pilots *accurately* informed on heat conditions inside gas turbine aircraft engines. They are ever alert to indicate and/or control critical high temperatures — to protect both pilot and plane in flight. Fenwal *custom-designs* a full line of Aircraft Gas Turbine Thermocouples for all jet engine needs.



2. X-RAYED FOR QUALITY at crucial stages of production, every Fenwal Thermocouple also undergoes further exacting tests for dependability. These include calibration inspection against Government Standards, double-checks for insulation resistance throughout operating temperature range, flame tests to assure fast, accurate response for extra safety in flight.



3. EXCLUSIVE "BELL MOUTH"* within the collar of Fenwal Thermocouples cushions and spreads vibration strain and eliminates high point-of-stress concentration. This means longer Thermocouple life. It is but one of many *Fenwal firsts* evolved during Fenwal's custom-engineering of *over 40 special types* of thermocouples . . . each *precision-engineered* to engine manufacturers' specifications for peak performance.

4. FOR MORE FACTS about Fenwal Aircraft Gas Turbine Thermocouples see Fenwal's new illustrated brochure. Fenwal — already a leader in the Aircraft Over-Heat and Fire Detection field — is fast becoming a leading supplier of custom-designed thermocouples for temperature indication and/or control in jet aircraft. Write for *your* copy of this brochure now to **Fenwal Inc., Aviation Products Division, 127 Pleasant Street, Ashland, Mass.**

Fenwal **AIRCRAFT GAS TURBINE THERMOCOUPLES**

Sense temperatures precisely . . . to fit your needs

*Pat. pending

there was little need for steel to have a strength better than about 180,000 psi. But the improvement of the strength-weight ratio of aluminum alloys forced the steel manufacturers to take a second look at their own.

Pioneering work was done by Crucible Steel, producing an alloy called Hy-Tuf, suitable for heat-treat up to 220,000-240,000 psi. Republic Steel, working with Bendix Aviation, modified 4330 steel to a similar range of properties.

The success of these steels prompted two aircraft companies to raise the goals even higher, and to ask first for 280,000 psi., and then 300,000 psi.

International Nickel picked up the challenge and started work on alloys for 300,000 psi. Final alloy included elements of carbon, manganese, silicon, nickel, chrome, molybdenum, vanadium and aluminum. The company says the steel alloy has a desirable combination of hardenability, ductility and impact properties at tensile strengths approaching 300,000 and yield strengths approaching 250,000 psi.

Convair engineers studied the B-36 high-strength steel landing gear after some peculiar static and dynamic failures, and came up with a number of recommendations for aircraft designers using the new alloys. Among them:

- **Evaluate carefully,** comparing with at least two familiar steels for ultimate yield and tensile strength, elongation and area reduction, impact strength, notched to un-notched ratio, repeated load S-N curves, sustained loads and manufacturing effects.
- **Eliminate chrome plating** of steel parts wherever possible.
- **Worry most about the design of joints;** that is where most failures occur.
- **Remember the desired life** and expected operational loads during design.

The Ft. Worth company also suggests that new equipment may be necessary and that it may be desirable to stock such steels separately.

Increased design cost may be on the order of three times current prices, says Convair, but such an increase would not be unreasonable.

Oxide Coatings

A new series of oxide coatings for high-heat applications has been developed by the Norton Co., Worcester, Mass., and has been successfully tested in a variety of applications at high temperatures and erosion.

The Norton Rokide series is designed to take over from ceramic and other coatings at temperature levels where these contemporary materials begin to lose value as heat insulators.

The Rokide compounds, in addition to having a higher temperature range than earlier coatings, also have much higher resistance to erosion. For this

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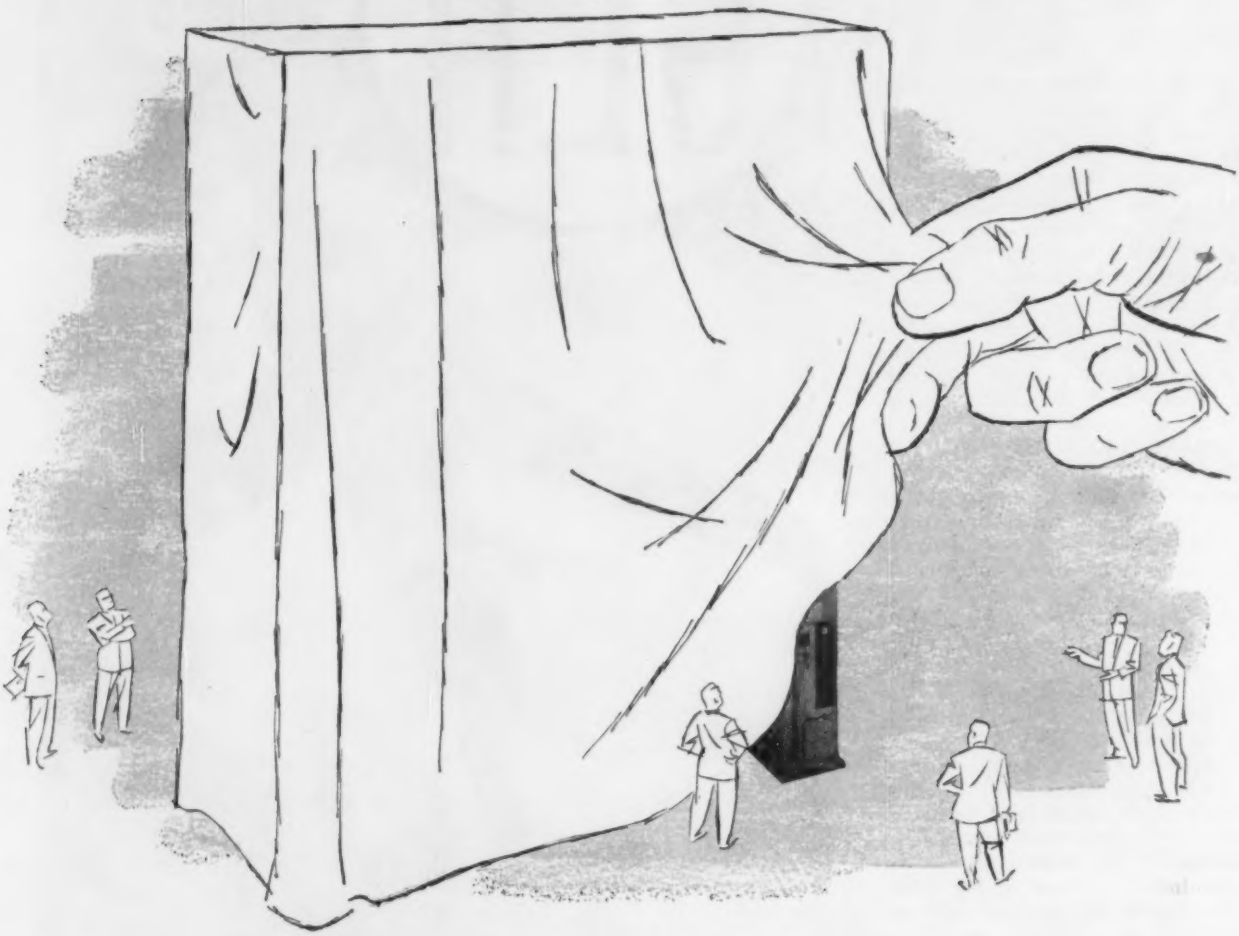

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reason, they have been called the first and only coatings to show any real promise in the rocket field.

In a typical application, a Rokide coating on regular steel replaced an expensive Hastelloy C alloy tailpipe on a ramjet. More than 32,000 air-to-air rockets—probably the T-131 spin-stabilized unit—have had their exhaust nozzles coated with one of the Rokide compounds.

The list of possible applications includes the use of the coating as a liner on uncooled rocket sustainer motors. Burning times could be doubled, say Norton scientists, for a typical rocket sustainer such as the Nike uses.

There are two general types of the Rokide coatings: oxides, applied in a molten state to metals or other base materials; silicon carbide, applied to graphite-base materials.

• **Rokide A is an aluminum oxide coating,** white in color, with a melting point of about 3,600F. General characteristics of the coating include chemical stability to its melting point, corrosion resistance to acids, bases and either reducing or oxidizing combustion gases, and non-conductivity electrically.

• **Rokide ZS is a zircon coating,** similar to the aluminum oxide type. It is off-white in color, is softer and has a lower melting point than Rokide A.

• **Rokide Z is a stabilized zirconia coating,** tan in color, with a melting point of 4,500F. It has very low thermal conductivity and is thus suggested as a thermal insulator. Newer than the other oxide coatings, Rokide Z has not yet been as extensively tested; its properties seem similar to those of Rokide A and ZS.

• **Rokide C is a silicon carbide coating on graphite,** particularly adapted to liners for rocket motor combustion chambers. The coating increases surface hardness of the graphite to that of silicon carbide, just below diamond and boron carbide in hardness. Oxidation resistance is increased by 300 to 400%.

There are limitations in the use of such coatings; they are not a sure cure for all high-temperature worries.

For example, these materials are about 10 times as strong in compression as they are in tension; thus, a coating on the inside of a cylinder will take many more hot-cold cycles than the same coating on the outside of the cylinder.

The porosity—although it is slight—of the coatings may limit their application. With long-time exposure to corrosive agents, there is the possibility for permeation of the coating and corrosion of the base metal.

Rokide coatings are applied with a gun similar to metal-spray equipment. Thickness of the coating is generally between .05 and .005 in. Typical coat cost for a Rokide C application is about $8 sq. ft. Norton will license use of the process without fee; a charge of $1.65 per pound of material used is to be paid by the licensee.

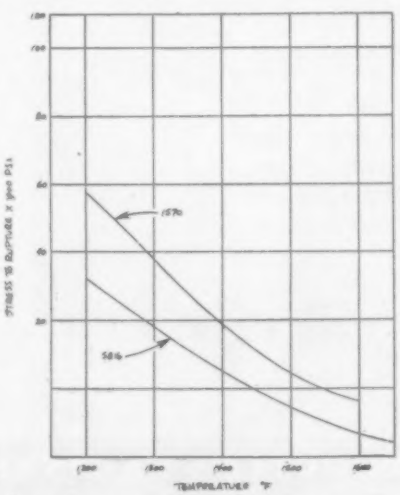
PLASTIC ARMOR protects holder from close-range small arms fire.

First license of the Rokide process has gone to the Bettinger Corp., covering immediate use of the Rokide A series. Bettinger, along with other companies such as Ryan Aeronautical and Solar Aircraft, has done much to develop the use of high-temperature coatings.

Vacuum-Melting Process

Titanium and its titanium alloy mill products now can be purchased with a guaranteed maximum carbon content of 0.1% from Mallory-Sharon Titanium Corp. The reason: The company's vacuum-melting process, which yields higher quality, purer ingots.

Vacuum-melting is one of the metallurgist's techniques for producing batches of high-purity metals. A process developed during the past 10 years, vacuum-melting now is swinging into large-scale use for the production of metals. In 1950, a batch of 50 lb. was rare; today 1,000-lb. batches are common, and engineers are talking about 10,000-lb. melts.



CARBOLOY 1570 is new vacuum-melt alloy for gas turbine buckets.

The process name is descriptive; metals are melted in a vacuum. This way they are produced essentially free of impurities, and with closer control of the composition. There is less loss of alloying elements by oxidation or side reactions. The result is alloys with better workability and formability, as well as improved properties.

Right now, most vacuum-melt alloys are used in gas turbines, and in landing gear struts. One such alloy is the new Carboloy 1570, a cobalt-titanium nickel-base material. Tests have shown it superior to earlier Carboloy alloys developed for gas-turbine blading in both creep and stress rupture.

Plastic Armor

In a Bronx alleyway, the sharp crack of a rifle cuts through the factory noise. The target is a square piece of reinforced plastic, a new lightweight armor developed for service by Bassons Industries Corp.

Protection against flak and small-arms fire is offered by the armor, which weighs only one-quarter as much as its metallic counterpart.

Bassons developed the armor as a natural outgrowth of its plastics research, which has led into such fields as Air Force, Navy and Marine helmets, vertical tail tips for aircraft and radomes for ground radar.

The armor is needed to protect equipment such as avionic gear in airborne installations. In an airplane like the Douglas A3D, auxiliary power systems are centralized around a power unit; the entire installation is protected from anti-aircraft fire by flak curtains. The use of plastic armor to replace the flak curtains interests Navy and USAF.

In Navy tests with small arms, the plastic armor has successfully resisted point-blank blasts from a 0.22-cal. bullet at muzzle velocities up to 2,858 fps. Both Navy and USAF have approved the armor for service use.

Bassons says the armor can be molded into intricate shapes, an impractical approach with armor metal. The plastic is, of course, non-magnetic; areas can be armor-protected that formerly could not risk the magnetic effects of metal.

Canadian Firm Grows

Aviation Electric, Ltd., is adding 19,000 sq. ft. of floor space to its main plant in Montreal, Canada, to be used for engineering, research and expansion of other departments. Addition will be complete in September. The company is Canadian representative for numerous English and American equipment manufacturers.

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thermal barriers
with, as yet,
unanswered
challenges!
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We manufacture many things for our air arm . . . precision gear assemblies for accessory drive units, actuators, transmissions, computers and controls . . . complete components such as bomb hoists, gun turrets, radar tracking and scanning assemblies, hydraulic actuators. But we're also hard at work on top secret equipment which, in the near future, will help arm our "flying St. Georges" as they slay the fiery dragon.
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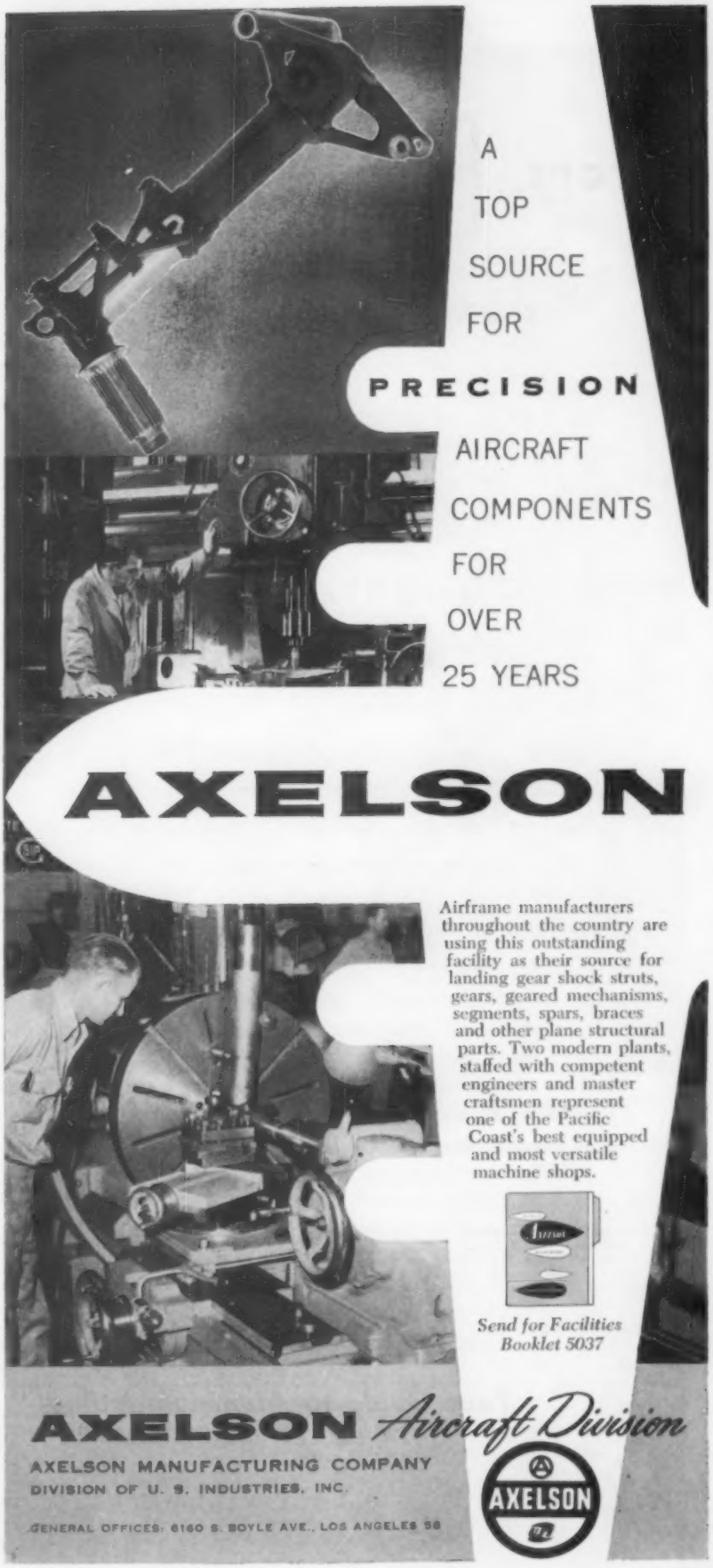
Jet fuel pump relief valve makers facilities and services, brochure, Fluid Regulators Corp., 250 E. Main St., Painesville, Ohio. . . .**Users of environmental equipment** are invited to obtain new quarterly information publication, Environmental Equipment Institute, Rm. 524E, 30 Church St., New York 7, N. Y. . . .**Research facilities** and equipment used in providing Molykote molybdenum disulfide lubricants, brochure, Alpha Molykote Corp., 65 Harvard Ave., Stamford, Conn.

Fansteel 77 machinable tungsten-copper-nickel alloy used in aircraft counterweights and radiation shielding, brochure, Fansteel Metallurgical Corp., Metals and Fabrication Division, N. Chicago, Ill. . . .**Gear making reference,** Gears of Integrity, Sier-Bath Gear & Pump Co., Inc., 9252 Hudson Blvd., N. Bergen, N. J. . . .**Facilities and equipment** brochure covers precision pressure control and aircraft instrumentation fields, Ideal-Aerosmith, Inc., 12909 S. Cerise Ave., Hawthorne, Calif.

Models 18136 and 18206 gear shapers, Bulletin SS-55, Michigan Tool Co., 7171 E. McNicholas Rd., Detroit 12, Mich. . . .**Manometer connector line** using airline tubes in place of current carrying circuits for use in wind tunnels, Bulletin SR-AL-1, Cannon Electric Co., Catalog Dept., 422 West Ave. 33, Los Angeles, Calif. . . .**Neoprene Notebook,** includes facts about Hypalon chemical rubber, Public Information Service, E. I. du Pont de Nemours & Co., Wilmington, Del.

Magnet wire catalog covers entire line of current publications, Electric Auto-Lite Co., Wire & Cable Division, Pt. Huron, Mich. . . .**MST 6A1-4V titanium alloy** metallurgy and chemistry, properties and working procedures, bulletin, Mallory-Sharon Titanium Corp., Niles, Ohio. . . .**Gear train-control motor combinations** and delivery dates, bulletin, Transicoil Corp., Worcester, Montgomery County, Pa. . . . **Precision cleaning and finishing** using wet abrasives, quarterly brochure, American Wheelabrator & Equipment Corp., 1001 S. Byrkit St., Mishawaka, Ind.

Model J welding head for precision work on small parts and subassemblies, Product Data Sheet 2-201, Equipment Marketing Division, Raytheon Manufacturing Co., Waltham, Mass. . . .**SAL sear aircraft** Huckbolt and SLS shear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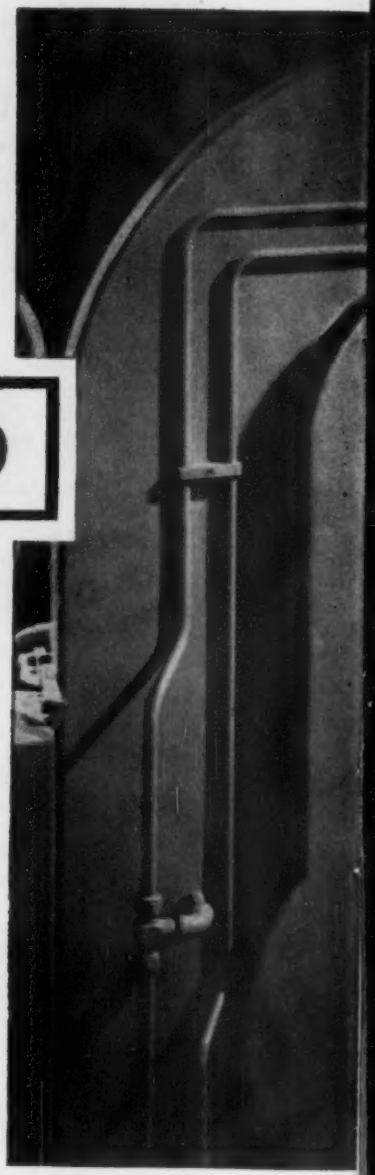

Alcoa's new, high-strength forging alloy X7079 offers aircraft designers these advantages over 7075:

GREATER STRENGTH in sections over three inches thick.

MORE UNIFORM MECHANICAL PROPERTIES in sections over three inches thick.

INCREASE IN DUCTILITY in short transverse directions.

TWO PER CENT LIGHTER in specific weight.

LESS QUENCH SENSITIVE. Alloy X7079 enables Alcoa for the first time to guarantee standard minimum mechanical properties in fully heat-treated and tempered sections up to six inches thick, prior to machining. This eliminates the high cost of rough machining heavy sections before heat-treating.

Many companies are already conducting tests of their own with X7079. If you have not yet tried it and have a need for heavy-section, uniform-strength forgings, call your nearby Alcoa sales office for complete information. ALUMINUM COMPANY OF AMERICA, 1800-G Alcoa Building, Pittsburgh 19, Pa.

Your Guide to Aluminum Value

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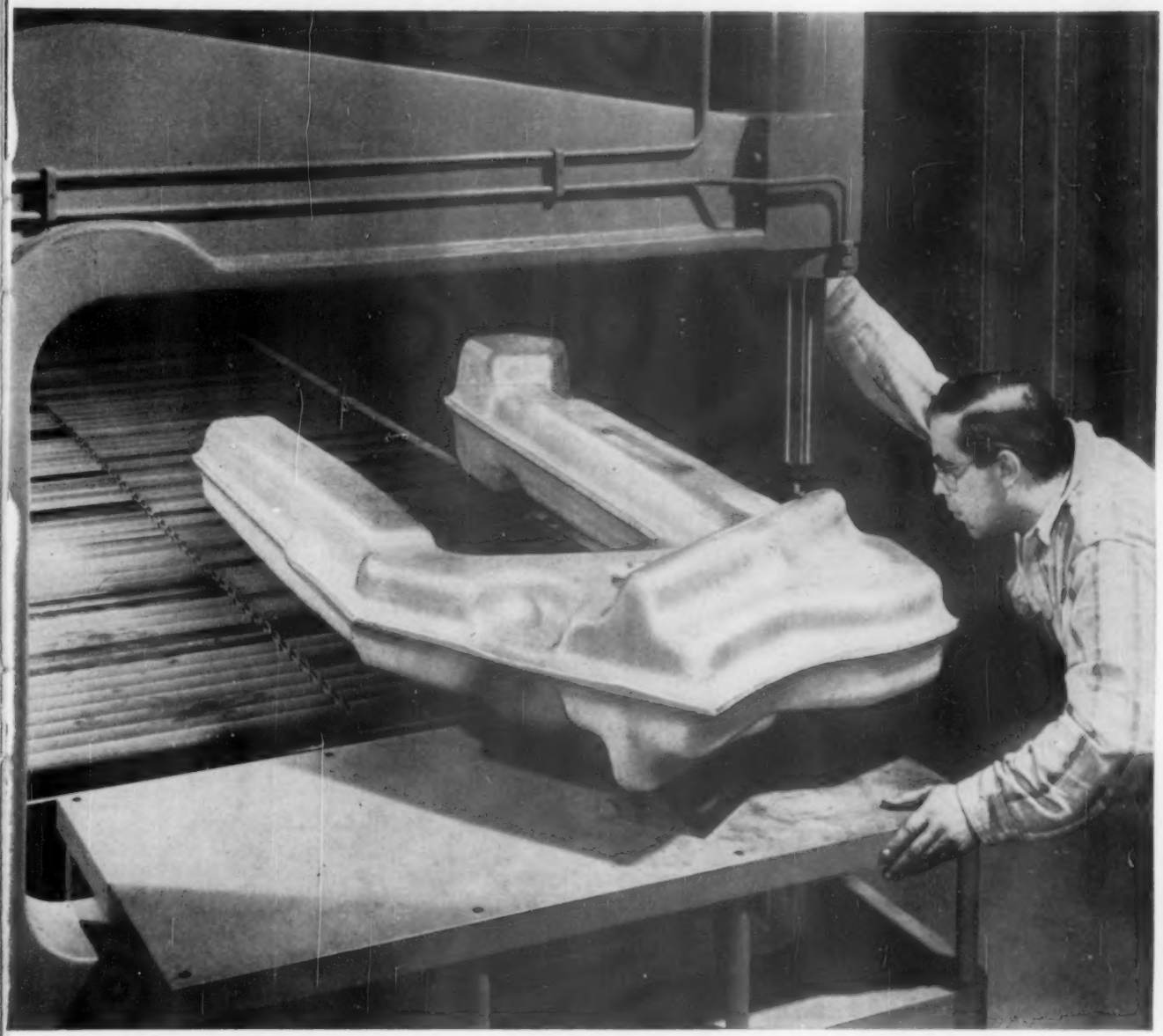

HIGHER AND MORE UNIFORM mechanical properties, in forging sections over three inches thick, are offered by the new Alcoa-developed alloy X7079.

MECHANICAL PROPERTIES SPECIFICATION, X7079

DIE FORGINGS

(Section thickness up to six inches, heat-treated at mill)

	LONGITUDINAL			LONG TRANSVERSE			SHORT TRANSVERSE		
	Tens. Str. ksi	Yield Str. ksi	El % in 4D	Tens. Str. ksi	Yield Str. ksi	El % in 4D	Tens. Str. ksi	Yield Str. ksi	El % in 4D
Guaranteed minimum	73	62	9.0	70	60	6.0	65	54	4.0
Typical	77	67	13.0	73	63	9.0	71	59	6.0

HAND FORGINGS

AXIS OF TEST SPECIMEN	GUARANTEED MINIMUM			TYPICAL		
	Tens. Str. ksi	Yield Str. ksi	El % in 4D	Tens. Str. ksi	Yield Str. ksi	El % in 4D
Parallel to forging flow lines	74	64	10.0	78	68	14.0
Other than parallel to forging flow lines	72	61	4.0	76	66	9.0

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SPECIFICATIONS

208/120 Volts, 0.75 Power Factor, Y-connected, 400 CPS

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*28E16-1	20	6	11	8.25	6000	60	AND10266 XVI-A
*28E17-1	30	5	13	8.25	6000	69	AND10266 XVI-A
*28E14-1	40	5	14.5	9.25	6000	83	AND10266 XVI-A
*28E15-1	60	6	16	9.25	6000	100	AND10266 XVI-A
28E19-1	10	6	8.4	6.5	8000	31	AND10262 XII-A
28E19-3	10	6	8.4	6.5	8000	32	New 9" Flange
28E20-1	20	6	8.5	6.5	8000	45	AND10262 XII-A
28E20-3	20	6	8.5	6.5	8000	46	New 9" Flange
28E21-1	30	10	12.4	6.5	8000	60	AND10262 XII-A
28E21-3	30	10	12.4	6.5	8000	61	New 9" Flange
**28E10-1	9	6	8.6	6.5	8000	39.5	AND10262 XII-A

*These generators include integral fan permitting full load continuously up to 80°C at sea level with no additional cooling.

**This generator incorporates a DC output of 30 volts, 50 amps capacity in addition to the AC output.

All generators have been designed to MIL-G-6099 and MS-33542 which specifies cooling air of 120°C at sea level, 40°C at 50,000 ft., and —12°C at 65,000 ft., and will deliver full rated load under these conditions.

Bendix Red Bank

HIGH-TEMPERATURE AC GENERATORS

meet military class C air-cooled specifications ... offer maximum performance at minimum size and weight... range from 9 KVA to 60 KVA

These generators are designed as part of complete Red Bank high temperature AC generating systems that also include magnetic amplifier voltage regulators and system protection components. For full details, write Red Bank Division, Bendix Aviation Corporation, Eatontown, New Jersey.

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Export Sales: Bendix International Division, 205 E. 42nd St., New York 17, N. Y.

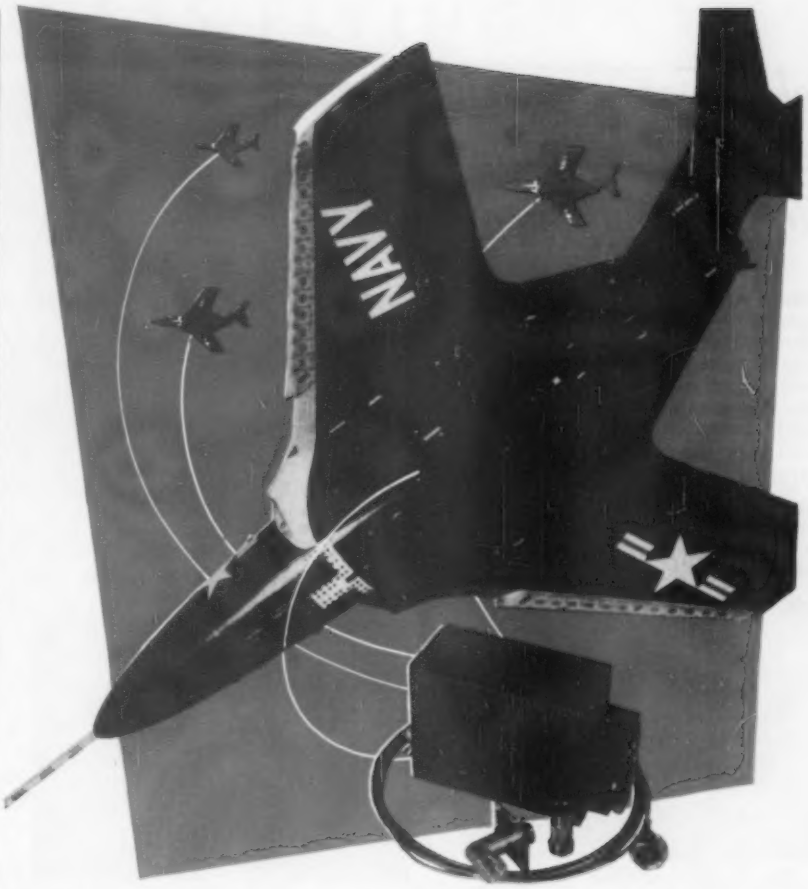
aircraft Huckbolt stump, brochure 8-350 for the former; 8-353 for the latter, Huck Manufacturing Co., 2480 Bellevue Ave., Detroit 7, Mich. . . . **Varipitch speed changers,** sizes from 1 to 75 hp., Bulletin 20B6013D, Allis-Chalmers Manufacturing Co., 1234 S. 70th St., Milwaukee, Wis.

Needle bearing design and application data, Catalog 55, Torrington Co., Torrington, Conn. . . . **Over 120 models of storage equipment,** including racks, bins, shelves and pallet frames, catalog, Frick-Gallagher Manufacturing Co., 110 S. Michigan Ave., Wellston, Ohio. . . .**Tool steel guide** covering more than 50 types of tool steels and cold-finished products, brochure, Vanadium-Alloys Steel Co., Latrobe, Pa.

Hydroforming facilities available for large prototype and pre-development components, pamphlet, C. B. Kaupp & Sons, Newark Way, Maplewood, N. J. . . .**Switch model mechanical pressure gage,** brochure, W. C. Dillon & Co., Inc., P. O. Box 3008, 14620 Keswick St., Van Nuys, Calif. . . .**Hydraulic test equipment** including controlled temperature simulation, folder, American Research Corp., 11 Brook St., Bristol, Conn. . . .**Model DR-400 ultrasonic cleaning equipment,** Bulletin DR-400, Acoustica Associates, Inc., Shore Rd., Glenwood Landing, L. I., N. Y.

SC-1071B strippable plastic coating, Bulletin M-3, Spraylat Corp., 1 Park Ave., New York 16, N. Y. . . .**Type PMCO 2 ST air-operated press-type three-phase Modu-Wave spot welder,** Bulletin 334-3, Sciaky Bros., Inc., Dept. L-2, 4915 W. 67th St., Chicago, Ill. . . .**Plastic hose and hose assemblies,** sheets and molded products of Compar modified polyvinyl alcohol resin, bulletin, Resistoflex Corp., Belleville 9, N. J. . . .**Stainless steel engineering data book** and detailed materials selection chart of 300 corrosive solutions, Cooper Alloy Corp., Hillside, N. J.

Vulcanized fibre sheets, tubes, rods and fabricated specialties, Folder DVF-55, Continental-Diamond Fibre Co., Newark, Del. . . . **Visual plant layout equipment,** 1955-56 price list and catalog, Visual Plant Layouts, Inc., Pennsylvania Ave. at River, Oakmont, Pa. Moly-Spray-Kote **aerosol-type spray for dry lubricating,** Bulletin 102, Alpa Corp., 65 Harvard Ave., Stamford, Conn. . . . **Engineering materials for modern industry** covers properties, grades and use of vulcanized fibre and Phenolite laminated plastic, National Vulcanized Fibre Co., 1055 Beech St., Wilmington 99, Del. . . . Fast-machine annealed and quenched-and-tempered **Rycut 50 leaded alloy steel,** Bulletin 14-6, Joseph T. Ryerson & Son., Inc., Box 8000-A, Chicago 80, Ill.



Edison continuous cable fire detection systems keep sure, constant vigil in new F9F-8 Cougars

There'll be fool-proof fire protection for many of the U. S. Navy's new, improved F9F-8 Cougars with EDISON Continuous Cable Fire Detection Systems at work.

Years of experience and constant research at the world-famous EDISON Laboratory were behind the development of this new coaxial cable system that offers the best—the surest protection for today's high-speed aircraft.

- **Simple, sure operation**—a single wire centered in thermistor material with a grounded outer sheath — temperature-sensitive at all points.
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BUSINESS FLYING

Solar's skills with special metals are "tailor made" for guided missile components

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Solar builds aircraft bellows from ½ in. diameter on up

fornia Institute of Technology. Solar design, development or production projects have covered motor and control development, pulse jet production, and fuselage and skin manufacture.

TYPICAL SOLAR products include precision bellows for aircraft and missiles, shown above. Others, below, are intricate turbine blades formed to with-

Compressor rotor for Solar gas turbine

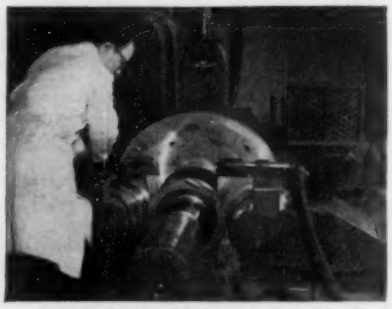
Solar builds first stainless nacelles

stand an inferno of heat, and stainless steel aircraft components that call for expert forming of half and full hard metal, and for miles of flawless welding.

Current production at Solar also includes pneumatic ducting, aircraft engine components, and many complex fabrications for aviation and other industries—both in the U.S. and abroad. A rapidly growing Solar product line, of importance to missile engineers, is the building of complete control systems for engines and other devices.

Mars gas turbine is small but powerful

GAS TURBINE ENGINES designed and built by Solar include the 50 hp Mars and the 500 hp Jupiter. Their simplicity, ease of maintenance, high power output in relation to size and weight, versatility and reliability, make gas turbines the ideal prime mover or auxiliary power source for many aircraft applications.



Solar has first Hydrospin machine

HYDROSPINNING is typical of the advanced metalworking techniques offered by Solar. Many contoured parts used in missiles can be made faster, more precisely, and at lower cost on the Hydrospin than by any other method. But Solar offers more than fabricating skills. Complete production facilities are supplemented by a well-rounded research organization, and by design, development and production engineering groups. Solar research and

Research facilities include 19 test cells

engineering "firsts" include the first practical jet engine afterburner, the first practical hand-started gas turbine engine, and a host of others ranging back to the first stainless steel aircraft manifold in the "hedge hopping" era of aviation.

PRODUCTION FACILITIES cover every type of metalworking—forming, machining, welding, brazing, casting, coating. Equipment ranges from precision experimental and tool shop machines to specially designed high production units. Solar has designed and built many of its own welding and fabricating machines for specialized needs. Some have proved so useful that they have been ordered by firms in the United States and Europe.

Engineering task force studies control devices

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BUSINESS FLYING

SAFETY POINTERS are given pilots attending clinic by Robert Dake, CAA division chief. A CAA engineer later ran through proper pre-flight procedure using Cessna 180.

CAA Runs Safety Clinic for Pilots

By Bernie Lang

Los Angeles—"Dos" and "don'ts" of safe flying are spelled out for business and private pilots at a series of clinics in principal cities of 11 Western states.

The program is one phase of a plan by Civil Aeronautics Administration's Fourth Region to reduce the number of preventable private flying accidents. Almost 200 of the 854 accidents reported last year in the 11 states would not have occurred if the pilots had been "safety conscious," according to CAA.

"It will take two years to completely evaluate the effects of this program," says R. E. Dake, chief of general safety for the CAA region. "But within the past year, the number of accidents has remained constant while the number of hours flown have increased about 10%."

Good Response

Some 30 flight clinics have been held to date. All-day safety briefing offers pilot refresher courses as well as up-to-date reports on new flight developments. Local civil groups, such as airport operators associations, join the CAA in sponsoring the clinics. They have received such favorable acceptance CAA may establish them as annual events in the West and may extend them nationwide.

In a recent session, pilots in the Los Angeles area gathered at Clover Field, Santa Monica, to discuss such problems as weather, pre-flight briefings and maintenance with experts in these fields. Highlights of the program were courtesy check rides and an introduction to instrument flying and its problems through the Link trainer. For many pilots attending, it was their first use of the Link trainer and first acquaintance with instrument procedures.

Pilots were told at the opening of the formal sessions that 95% of reported accidents are caused through pilot error, and of this figure 22% are caused by "voluntary" or induced error. Explaining voluntary error, a CAA spokesman said "it is a case where the pilot just 'goofed' or he knew better but took a chance anyway."

He said he believes the safety clinics will do much to eliminate the voluntary accident.

Pre-Flight Check

Importance of pre-flight checks was discussed while a CAA maintenance engineer demonstrated an aircraft inspection looking for missing parts, defective wiring, loose fuel tank caps, cowling fasteners, and nuts and bolts. A picture of a corroded airplane wing rib resulting from a rat's nest built in a plane that was not in constant use was shown to point out the oddities that do happen.

HOW RATS' ROOST in airplane wing damaged structure is noted by pilots at session.

Other sessions included briefings on flight weather, aircraft communications and aviation medicine.

Pilots were warned to check weather before takeoff, plan an alternate course just "in case," and keep a check on the weather while in flight. A representative of the U.S. Weather Bureau for Los Angeles gave the local times of aviation weather broadcasts and detailed the weather service available to fliers.

Pilots were encouraged to visit local CAA communication stations for familiarization. Proper method for filing flight plans was emphasized. Radar landings were explained:

"Ask for radar approach and give your heading, altitude and approximate position," a Los Angeles Airport radar tower representative advised. He said practice landings for private pilots could be arranged over any weekend, when traffic is at a low point.

PRIVATE LINES

Rubber floats for Sikorsky S-55 helicopters are now available in kit form from Sikorsky Aircraft Division of United Aircraft Corp., Bridgeport, Conn. Initial installation takes two or three men about four days; subsequent conversions take less than one hour.

German Aircraft Authority has licensed several light French aircraft for production in that country. Planes include the Jodel Bebe and D.11, Druine and Piel Emeraude.

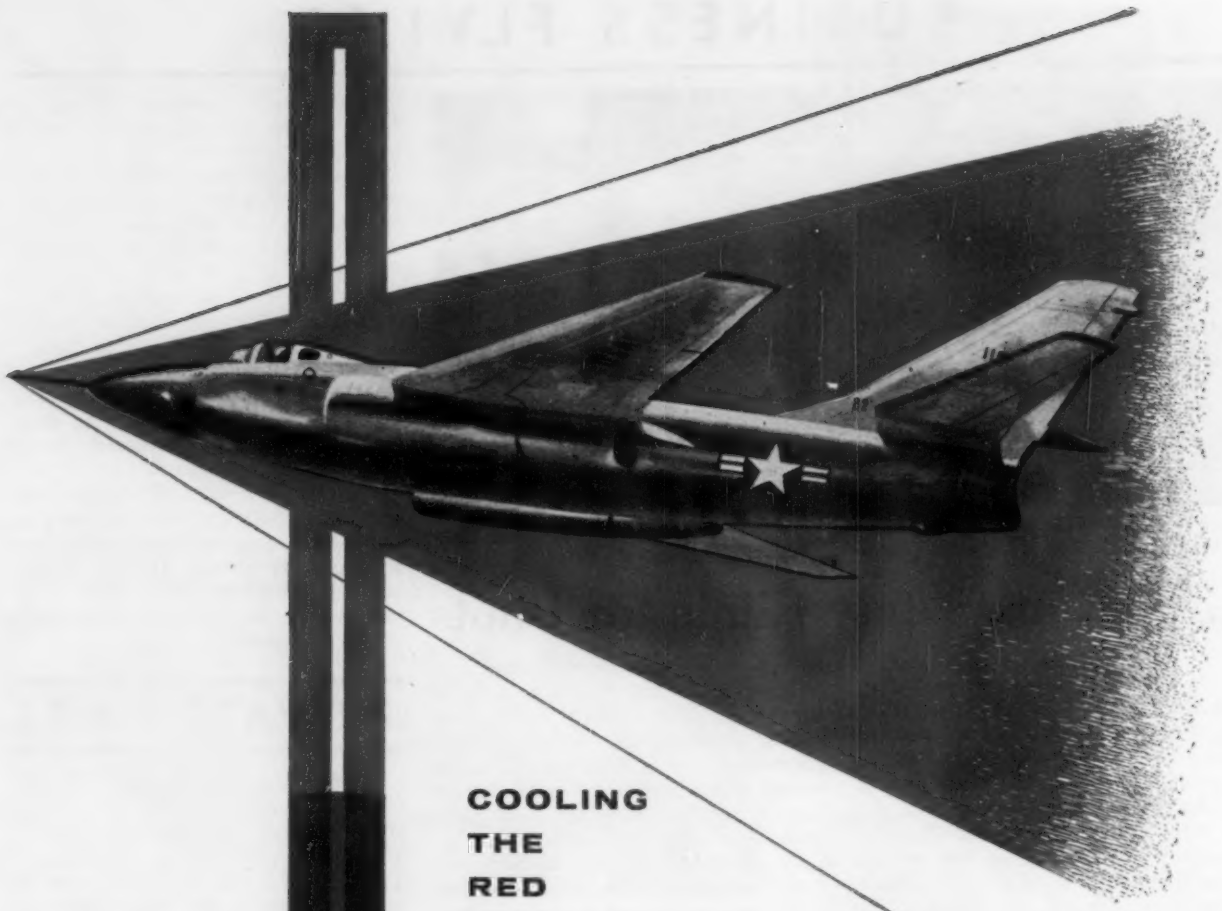
Two Westland-Sikorsky S-55 copters have been purchased by Royal Dutch Shell Group for use in Persian Gulf offshore oil drilling operations. . . . Shell's associates, N. V. Nederlandsche Nieuw Guinee Petroleum—Maatschappij, have contracted to use two S-55s to work on New Guinea drilling operations. The craft will then move to British Borneo for offshore oil drilling work.

More than 300 firms in New York State use business aircraft for transporting personnel and materiel, according to the N. Y. State Department of Commerce.

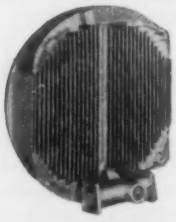
VHF 27-channel transmitter-receiver has been put on market by National Aeronautical Corp., Ambler, Pa., for $480 including factory-installed crystals, less power supply. Unit measures 3-in. x 6¼-in. x 6¼-in. VC-27 Simplexer receiver has "whistle-stop" tuning. Crystals are miniaturized type developed by Narco for its DME.

AVIATION SAFETY

Wanna be



COOLING THE RED HOT JETS!



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AVIATION SAFETY

CAB Report on Alaska Coastal Airlines G-44 Crash

Pilot Ignored Visual Flight Rules

THE ACCIDENT

An Alaska Coastal Airlines Grumman G-44 amphibian, N. 67794, operating as scheduled Flight 60, crashed in a mountain pass a few minutes after takeoff from Pelican City at 1305,[1] Nov. 4, 1954. The pilot was fatally injured; the two passengers, though seriously injured, survived. The aircraft was demolished by impact and fire.

HISTORY OF THE FLIGHT

Flight 60 originated at Sitka, Alaska, with stops scheduled at Pelican City, Hoonah, and Juneau, the destination. Before departure from Sitka, the dispatcher in Juneau issued clearance for the flight to proceed DVFR (Defense Visual Flight Rules) to Hoonah and wait, if necessary, at that station for weather to improve in the Juneau area. The flight plan indicated estimated time from Sitka to Juneau, including stops, would be two hours and fifty minutes. Fuel consumption was estimated at 60 gallons, with 20 gallons reserve upon arrival at Juneau. Gross weight of all disposable load at takeoff was 1,401 pounds, 30 less than the maximum allowable. The flight departed Sitka at 1153 with Capt. James C. Rinehart (pilot), four passengers, cargo, mail, and baggage.

The route between Sitka and Pelican City follows the North Pacific shore. The flight landed at Pelican City at 1235. Two passengers deplaned and 88 pounds of baggage, mail, and cargo were taken off; 159 pounds of cargo were added. The aircraft was not refueled. The pilot reported by radio that the flight departed Pelican City at 1305 enroute to Hoonah. This was the last radio contact.

When the flight became overdue at Hoonah, search operations were instituted. The Coast Guard was notified at 1655 and began search. At approximately 0800 the following morning, the pilot of a private aircraft located the wreckage in a mountain pass several miles southeast of Pelican City. A Coast Guard and civilian ground rescue party arrived the afternoon of Nov. 5, rendered first aid to the two passengers, and stayed until the survivors and the body of the pilot were evacuated by helicopter on Nov. 6.

INVESTIGATION

The survivors advised that after takeoff at Pelican City, the flight proceeded southeast up Lisianski Inlet about 11 miles and turned left up a mountain pass near Soloma Point. The sides of the mountains were visible, but clouds covered the tops and extended about halfway down the slopes. The flight encountered rain, fog, and turbulence as it proceeded up the pass.

The pass runs approximately northeast between Lisianski Inlet and Tenakee Inlet, winding between two mountain ridges. There are several sharp bends in its 10-mile length. The floor of the pass rises rapidly for approximately the first three miles from the Lisianski Inlet, or west, side. The highest point is at approximately the 1,500-foot level, whereupon the pass slopes down and widens for the next seven miles to Tenakee Inlet. Ridges and peaks of the mountains on each side rise to approximately 3,000 feet.

Near the summit of the pass, the pilot successfully negotiated a bend, turning right approximately 90 degrees. Almost immediately after negotiating the first bend, it was necessary to turn left for a second sharp bend. The pass at this point is about one-half mile wide. The survivors said that during the moderate to steeply banked left turn, the aircraft encountered a downdraft, dropped, and struck the ground on the left wing tip, and cartwheeled in final impact.

Both passengers were rendered momentarily unconscious, then made their way out through a break in the fuselage. Their seat belts did not fail. The pilot was extricated from the flaming wreckage and lived for about three hours, but never fully regained consciousness.

Examination at the scene revealed that the accident occurred at the 1,500-foot level in an open area of soft, moss-covered earth with numerous outcroppings of large rocks. The scene of the accident was about three miles from Lisianski Inlet and approximately one-fourth mile due south of the summit. Two prominent gouges indicated that the left wing float and wing tip struck while the aircraft was in a moderate to steeply banked left turn and on a west heading. The left wing float was destroyed and the wing panel sheared from the center section. Fuel spilled into the wreckage when fuel lines broke and fuel tanks ruptured. Fire broke out and burned unabated until all fuel was consumed.

The landing gear and flaps were retracted at the time of the accident. The pointer of the airspeed indicator was jammed at 160 mph. Both propellers were found in maximum low pitch and evidence indicated that considerable power was being developed. No evidence was found to indicate malfunction or failure of airframe, engine, or propeller components prior to impact.

Weather conditions at the scene of the accident were not observed by any witness on the ground. Weather conditions on the eastern mountain slopes near Tenakee Inlet were learned from an employee of Alaska Coastal Airlines who was hunting in the area. He said the sky was overcast and there was light rain throughout the day and dense fog filled the pass at about the 1,500-foot level.

The U. S. Weather Bureau advised that the most probable weather conditions prevailing in the accident area were: "Scattered to occasionally broken clouds near 500 feet with an overcast between 2,000 and 4,000 feet with good visibility along the west side

[1]All times referred to herein are Pacific standard and based on the 24-hour clock.

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ad.vance'ment (ad.vans'ment), n., promotion to a higher place or dignity; progression, improvement.

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of Chichagof Island, but with sharply reduced ceilings and visibility along the higher ridges in rain and fog. Conditions along the eastern and southern slopes were probably worse than along the western side, with the lower deck of clouds broken to overcast and with much lower visibility. The winds prevailing at the scene of the accident are highly problematical since conditions in this area were extremely variable due to the rough terrain. Turbulence was undoubtedly present along and in the lee of mountain ridges and through the passes with strong gusty easterly winds through the passes." The freezing level over Chichagof Island at the time of the accident was estimated to have been between 4,000 and 5,000 feet.

The Alaska Coastal Airlines station manager at Sitka stated that prior to departure of Flight 60 at 1153 he and Captain Rinehart studied the 0730-1030 weather sequences. Weather from the Chichagof Island area, received at 1020, and the Pelican City weather, received at 1043, were made available to the pilot. This weather information was essentially the same as that reported above.

The routes over which Alaska Coastal Airlines operates serve various coastal and island points in southeastern Alaska. The coastlines are characterized by high mountains, numerous bays and fjords, and islands with high mountains. Since most of these operations are over water, amphibian aircraft are used by the company to a great extent.

Several overland routes are frequently utilized, many of which involve flight through mountain passes. The pass in which this accident occurred is the regular route between Pelican City and Hoonah, via Port Frederick Sound, particularly when weather conditions on the overwater route around the north end of Chichagof Island, which is the alternate route to Hoonah, preclude VFR operation. Weather conditions along this alternate route, while poor, appeared to have been satisfactory for VFR flight. All aircraft operated by the company which are 12,500 pounds or less gross weight are restricted to DVFR flight.

That part of the company operations manual pertaining to the overland route between Pelican City and Hoonah, via this particular pass, reads: "This route provides a ten-mile crossing of land between Tenakee Inlet and Lisianski Inlet. This crossing will be made at 3,000 feet."

Investigation disclosed that Capt. Rinehart had approximately 20 years experience as a professional pilot in Alaska, most of this having been acquired in southeastern Alaska. He had approximately 14,000 pilot hours, of which about 600 were in Grumman G-44 aircraft.

The company, the aircraft, and the pilot were currently certificated.

ANALYSIS

When the flight departed Pelican City, the pilot apparently did not have sufficient information on weather conditions within the pass and on its Tenakee Inlet side. He should, however, have known of the generally poor conditions in the pass and beyond it through weather briefing before departure from Sitka. The pass is relatively narrow, and once entered, a turn to reverse course is difficult.

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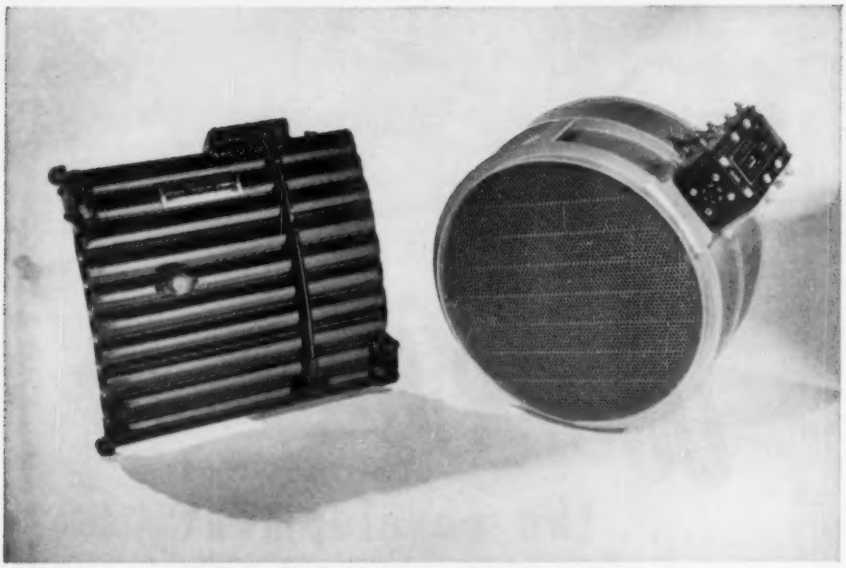

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Based on unique, proprietary processes for producing and brazing thin metal sections, plus the largest wind tunnel laboratory facility of its kind, the Clifford Company has pioneered the major developments in this field since 1940.

As flight conditions become increasingly severe with the drive for higher speeds over greater altitude ranges, temperature regulation of engine lubricating oil becomes a critical, sometimes limiting, factor in aircraft capabilities.

The relatively simple requirements of oil cooling in pre-war reciprocating engines, have today become complex heat exchange problems further complicated by the need to provide adequate heat rejection capacity within strict limits of size, weight — and sometimes even shape.

Inert gas welding of reciprocating engine oil cooler.

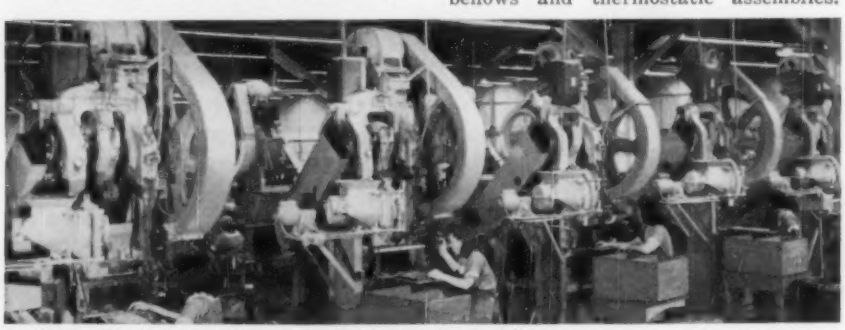
Three unique assets Clifford brings to bear on aircraft heat exchange problems have been largely responsible for the fact that it has initiated the major advances in the oil cooler field since 1940.

One asset is Clifford's ability to produce and fabricate thin metal sections, based on its own developments in deep drawing and extrusion.

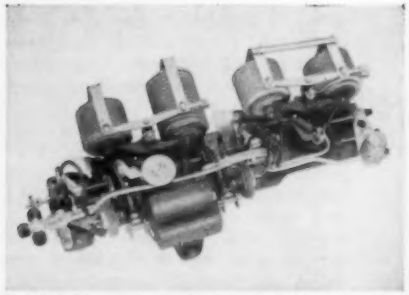
Another is its exclusive proprietary process for brazing thin metals — particularly aluminum — which is unmatched by any other process.

Third is Clifford's wind tunnel laboratory — the largest, most completely equipped technical facility of its kind.

Clifford's background since the company's inception in 1926 was in the manufacture of thin walled metallic bellows and thermostatic assemblies.



Production line impact extrusion of aluminum heat exchanger tubes.



Bombsight servomechanism is typical aircraft application of Clifford bellows for automatic compensation of changes in temperature, pressure and other factors.

Typically, it broke into this field by developing the new, superior hydraulic forming method of producing bellows which today is the standard process throughout the world.

Handling thin metal sections to produce products for the control of heat proved excellent basic experience to back up Clifford's entry into the aircraft field.

The deep drawing and extrusion process attracted the attention of the armed services in the pre-war preparedness days and Clifford was asked to produce copper tubes for the manufacturers of aircraft oil coolers and coolant radiators.

Once acquainted with the field, it was not long before Clifford's metallurgical background uncovered an area of opportunity. Copper coolers were not wholly satisfactory. The dip soldering method of fastening the tubes so annealed the metal that many failures were experienced at pressures of only 100 psi or less. With oil pressures trending steadily upward in the newer engines, the situation was right for the introduction of a better design if one could be found.

Five years of metallurgical research at Clifford had resulted in a unique, proprietary process for brazing thin aluminum sections. Combining its earlier development in deep drawing and extrusion of thin tubing, Clifford independently designed and produced the first all-aluminum oil cooler and coolant radiator.

The new unit weighed only one-third as much as conventional copper coolers and life cycle tests showed a far higher service expectancy. The air services gave their enthusiastic approval and Clifford found itself in the forefront of a new field.

First to use the new aluminum oil coolers and coolant radiators were the Air Force's P-40 and P-38. Others quickly followed. At the war's end, Clifford was the sole producer of all-aluminum oil coolers whose products had been combat tested.

Lockheed's famous P-38 was among the first military aircraft to use Clifford's newly developed all-aluminum oil coolers and coolant radiators.

Coolant radiator of the type used in wartime liquid-cooled reciprocating engines.

Early jet engines coming along after the war required no oil cooling device. Oil was simply sprayed on the bearings and then ejected overboard. But with General Electric's contract to produce the J47-C, Clifford was asked to develop a suitable cooling system.

A completely new concept of oil cooling was suggested by Clifford. Since jets consumed large amounts of fuel it was possible to pass cold fuel on one side of the heat exchanger, hot lubricant on the other. With the flow governed by thermostatic valves, the lubricating oil is kept at optimum temperature.

The new design, since it did not depend on ram air for cooling, could be mounted out of the air stream and more easily armored. These and other advantages caused it to be adopted as standard for military jet aircraft.

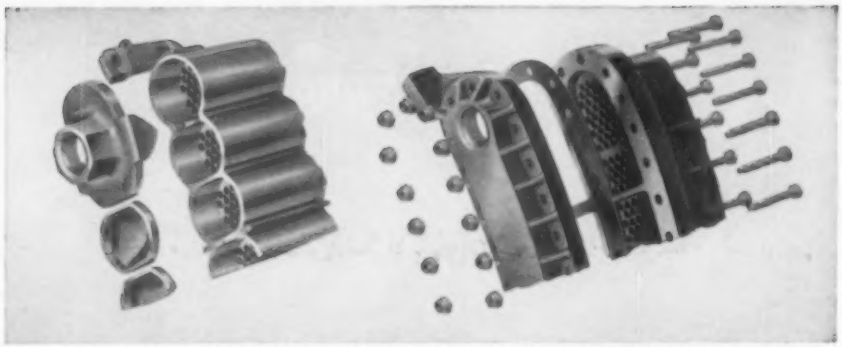
Later improvements resulted in substantial weight reduction and the elimination of numerous parts. Employing an extruded aluminum shell fastened by its proprietary brazing process, Clifford is today the only company able to produce these superior all-brazed, all-aluminum oil coolers.

Clifford's wind tunnel laboratory plays an increasingly important role in keeping the company in the forefront of aircraft heat exchanger developments. Ability to simulate service conditions with great accuracy eliminates the need for time consuming, expensive field testing of new designs. Its vast store of empirical knowledge permits rapid translation of thermodynamic theory into practical design without need for a succession of pilot models.

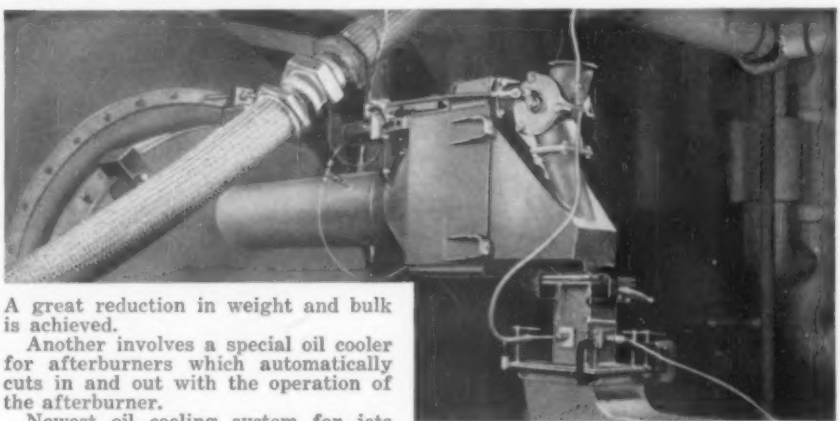
In few companies is there such a direct linear connection between research and production as can be found at Clifford.

New developments, still under military or proprietary wraps include a new oil cooler design based on using the latent heat of vaporization to cool the oil and vaporize part of the fuel before it enters the combustion chamber.

Sikorsky's H-39 helicopter which recently established a world's speed record, carries a Clifford oil cooler.



Advanced, simplified design of liquid type oil cooler for jet engines (left) shows obvious advantages over original design pioneered by Clifford. Gaskets, bolts and nuts are eliminated, weight reduced 28%, and a stronger, unitized, all-brazed construction achieved.



Wind tunnel test of air-to-air type heat exchanger assembly. Unit shown has integrally mounted control valves and actuator, and is used in aircraft air conditioning systems.

A great reduction in weight and bulk is achieved.

Another involves a special oil cooler for afterburners which automatically cuts in and out with the operation of the afterburner.

Newest oil cooling system for jets takes care of "high altitude cooling" conditions. When fuel flow drops too low to provide adequate cooling, thermostatic valves cut in an auxiliary air type cooler.

Helicopters pose especially difficult problems. Changes in direction from horizontal to vertical flight — or to hovering — makes their oil cooling demands highly variable. Clifford is currently developing two answers to these problems. One is an air-type cooler placed in an eductor. Engine exhaust is used to induce a flow of air for cooling. The second employs an air-type cooler placed in the air stream, but having in integral fan driven by a fluid motor. Oil temperature determines the operation of the fan through the action of thermostatic valves.

Rockets, missiles and avionic equipment are other areas in which Clifford is working. The company is also deep into nuclear energy heat exchange involving the handling of molten metals.

In all these areas, Clifford's unmatched facilities in aircraft heat exchange; and its unique ability to produce, fabricate and braze thin metal sections by proprietary processes is largely responsible for its present leadership in aircraft heat exchanger design.

For further information write: Clifford Manufacturing Company, 175 Ipswich St., Boston 15, Mass. *Division of Standard Thomson Corporation.* Offices in New York, Detroit, Chicago, Los Angeles and Waltham, Mass.

Self contained oil temperature regulating valves are designed and manufactured by Clifford for oil cooler applications.

Installation of oil-to-fuel type oil cooler on turbo-jet engine.

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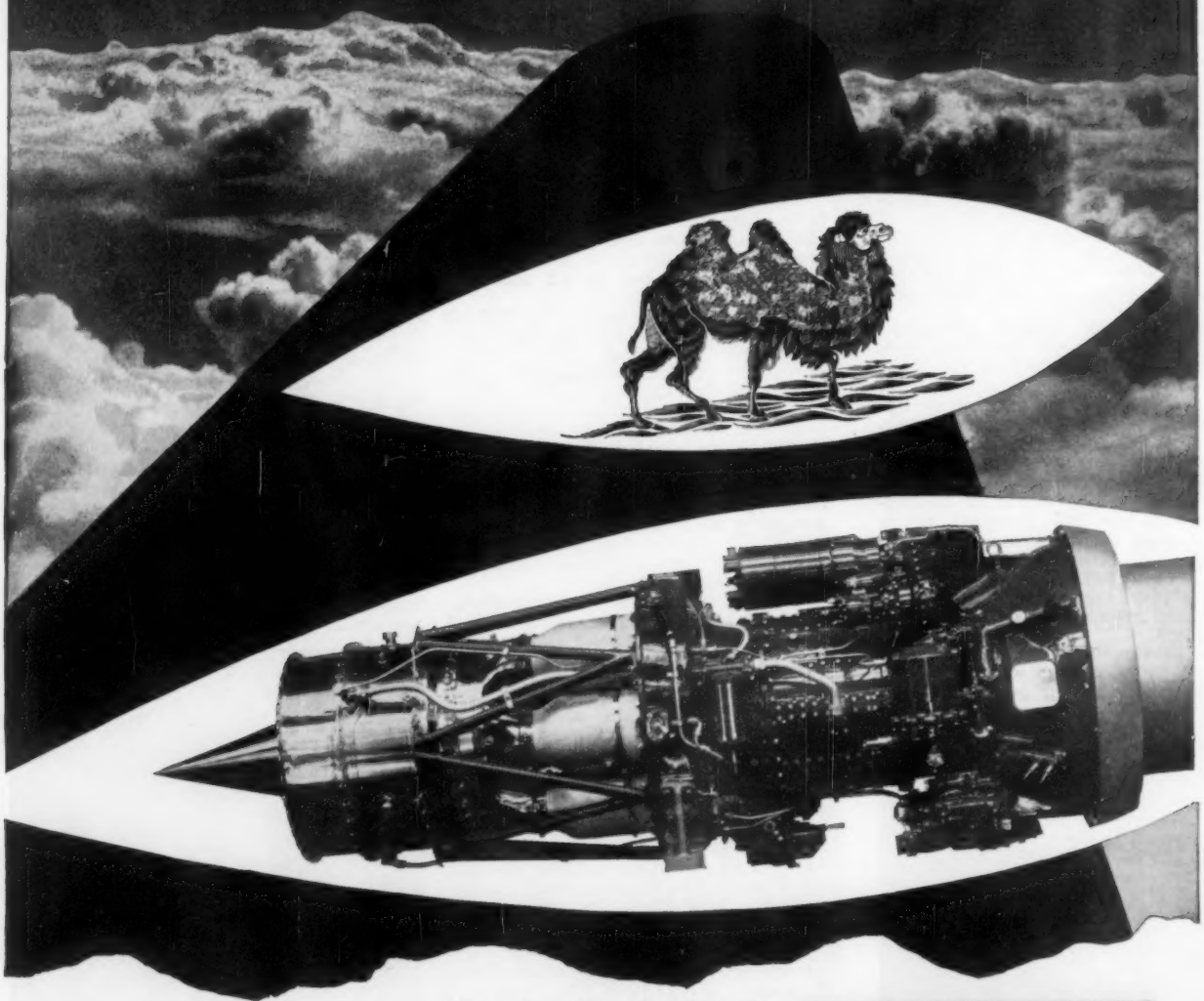
* Easy maintenance—independent unit construction.
* Ease of control—single lever control, with manual over-ride, guards against engine over-speeding and over-fuelling.
* Automatic temperature compensation.
* At the first attempt the Eland has recently passed a 150 hour type test rehearsal at the full 3,000 e.h.p. rating.



NAPIER Eland turbo-prop

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lower than the altitude prescribed by the company operations manual (3,000 feet) for this crossing. The base of the clouds was lower than this prescribed altitude, thus forming a tunnel through which he attempted to fly. Weather conditions near the summit of the pass, where the accident occurred, were only slightly above zero ceiling and visibility. The tunnel at this point was therefore almost blocked for contact flight.

The location of the wreckage near the second bend, and the heading of the aircraft at impact indicate that the pilot started to negotiate the second sharp bend in the pass when weather conditions made it necessary to turn back.

Study of the short gouges in the earth at the point of initial impact, the nature of the left wing panel damage, and the limited area of wreckage distribution demonstrated that the wing tip struck the ground while the aircraft was in a steep left bank and in a high rate of sink, thus indicating a left slip before impact. This was probably due to encountering severe turbulence while in the steep left turn and resulted in an abrupt and uncontrolled loss of altitude combined with an uncontrolled continuation of the left turn. This assumption is strengthened by testimony of the passengers in their descriptions of what occurred just prior to impact.

It is not known why the pilot elected to take the regular route through the pass, as opposed to choosing the alternate route over the water around the north end of Chichagof Island. The regular route through the pass saves about ten minutes' flying time, which might have been a consideration.

As the aircraft climbed after takeoff from Pelican City, it must have been apparent to the pilot that the pass could not be negotiated VFR at the prescribed 3,000-foot altitude, since the base of the clouds was lower than this altitude.

Although Capt. Rinehart had a wealth of experience in flying the rugged terrain of this area, this accident is indicative of questionable judgment and failure to abide by company procedures promulgated for safety reasons. The Board must therefore conclude that he pressed into prohibitive weather conditions.

FINDINGS

The Board finds that:

1. The carrier, the aircraft, and the pilot were currently certificated.

2. The pilot was briefed on weather conditions over the route Sitka-Juneau, via intermediate stops, before departure from Sitka.

3. Flight 60 departed Sitka at 1153 and proceeded uneventfully to Pelican City, landing at 1235.

4. The flight departed Pelican City at 1305 with two passengers, mail, and cargo, proceeded up Lisianski Inlet to Soloma Point, and turned left up a mountain pass regularly used for the route to Hoonah.

5. Weather conditions within the pass were: Rain, fog, severe turbulence, and low ceiling, with the base of the clouds extending about halfway down the 3,000-foot mountain slopes.

6. Flight 60 crashed one-fourth mile due south of the summit of the pass about 1,500 feet above mean sea level, the pilot

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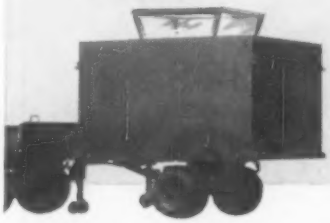

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having negotiated about three miles of its 10-mile length.

7. The aircraft struck the ground on a west heading at a sharp bend in the narrow pass, having encountered strong turbulence in a steep left bank at low altitude.

8. The pilot had reversed course when the accident occurred.

9. The two passengers survived but the pilot was fatally injured.

10. Alaska Coastal Airlines flights in this type aircraft are restricted to Defense Visual Flight Rules operations.

11. The Alaska Coastal Airlines operations manual specified that the pass must be flown at 3,000 feet altitude.

12. The pilot was attempting to negotiate the pass at less than the altitude specified in the operations manual and in weather conditions which were lower than DVFR requirements.

PROBABLE CAUSE

The Board determines that the probable cause of this accident was loss of control of the aircraft during a steep turn in severe turbulence while the pilot was attempting to conduct visual flight at less than the required altitude and weather minimums.

By the Civil Aeronautics Board:

Ross Rizley
Joseph P. Adams
Chan Gurney
Harmar D. Denny

(Josh Lee, Member, did not participate in the adoption of this report.)

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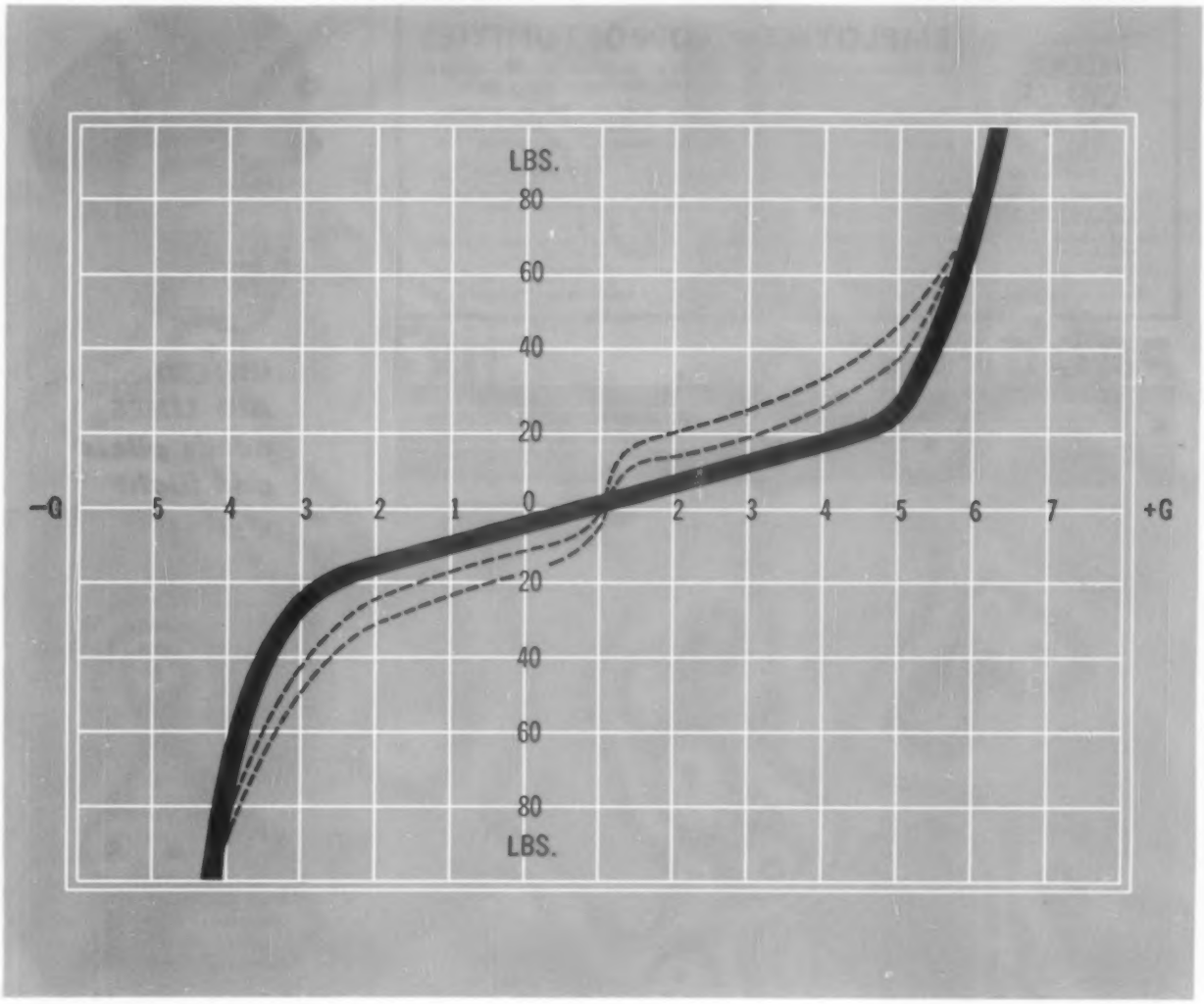

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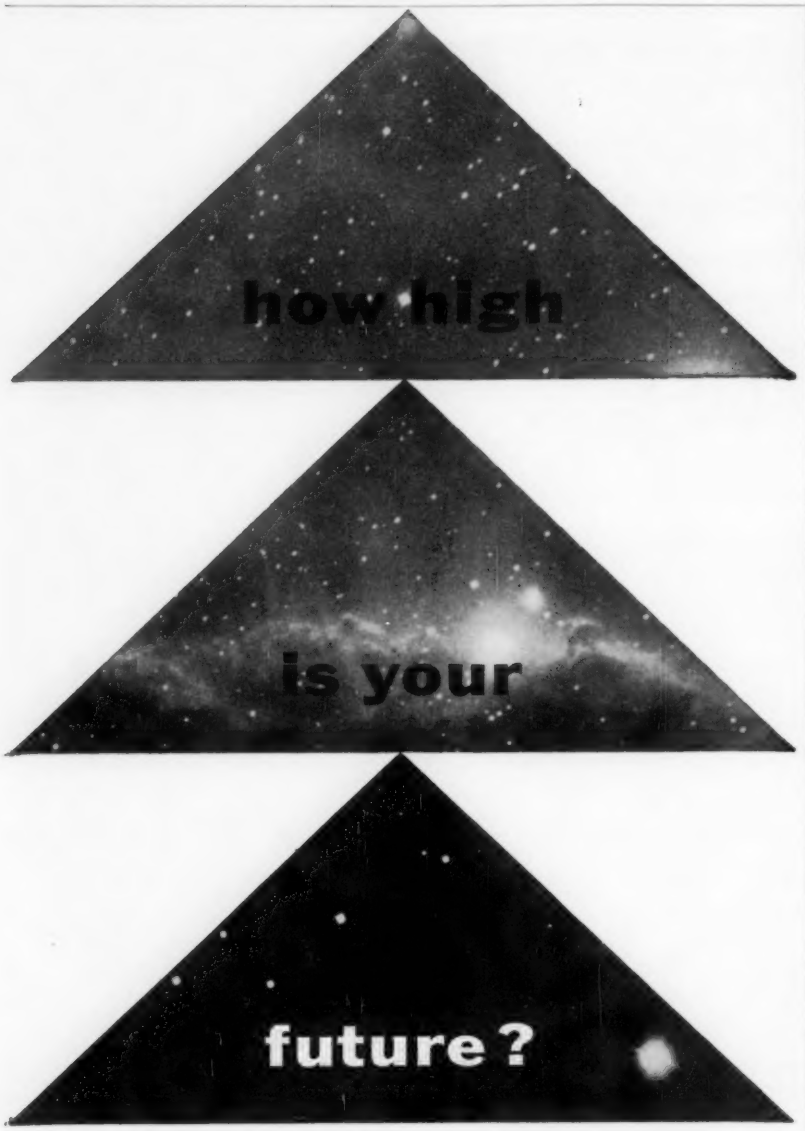

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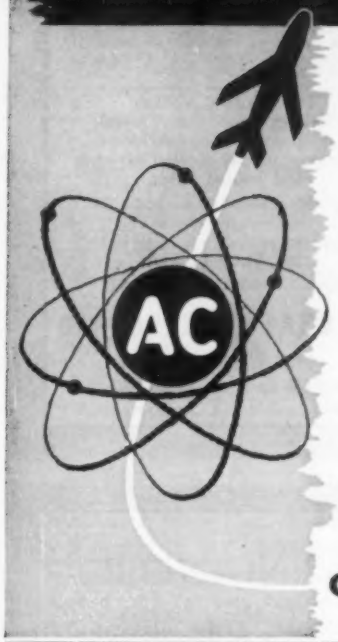

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Eastern-Braniff Balboa Pact Approved

CAB permits first through service from New York to South America via Canal Zone, ends 4-year case.

By Craig Lewis

Washington, D. C.—The first through-plane service between New York, Balboa and South American points is possible through Civil Aeronautics Board approval of an Eastern Air Lines-Braniff Airways interchange pact.

Board approval of the Eastern-Braniff interchange comes after more than four years of investigation of New York-Balboa through-service and considerable delay caused by White House processing and, more recently, by feuding between Pan American World Airways and W. R. Grace & Co. over who should operate an interchange with National Airlines.

Along with its approval of the Eastern-Braniff interchange plan, CAB has given National, Pan American and Panagra a new deadline of Aug. 1 to produce an agreement for an interchange to parallel the Eastern-Braniff operation.

The approved agreement and the dispute between Grace and Pan American are the result of the CAB order, approved by the White House Apr. 18, which settled the Balboa case. The Board found that one New York-Balboa interchange should be operated by Braniff and Eastern and the other operated by National, Pan American and Panagra.

Heated Exchange

Both Eastern and Pan American balked at the Board's findings, and the 60 days allotted by CAB elapsed before the two big carriers finally completed negotiations with National and Braniff.

The Board extended the deadline to June 30, and Eastern and Braniff filed the new agreement which has been approved.

Pan American and Grace couldn't get together on an agreement, so Panagra and PAA each filed separate agreements with National. In the past month, there has been a series of heated exchanges between Grace and Pan American, largely through letters, briefs and answers sent to the CAB and its chairman, Ross Rizley, in Washington.

The Board says it has examined the applications filed by National and Panagra, and by National and Pan American, and has concluded that they don't conform to its decision in the Balboa case.

CAB Criticism

"Neither the Panagra-National nor the Pan American-National agreements meet the fundamental requirement that the through service be provided by agreement of all the carriers that are concerned," CAB says.

"The Board envisioned a voluntary arrangement to provide the through service and still adheres to that view."

CAB makes it clear that it wants all three carriers to participate in the proposed interchange agreement and says it trusts "that the parties involved will proceed promptly to a satisfactory resolution of their difficulties in the light of our statement. . . ."

In its order, the Board notes that "there have been filed by Pan American and W. R. Grace & Co. interests a plethora of documents replete with ad hominum arguments with respect to the motives of the other party. . . ." CAB also observes that a great number of documents on behalf of each party have been received from several different spokesmen.

'Multiple Spokesmen'

"We believe," CAB says, "that multiple spokesmen are unnecessary for a proper presentation of the matters in controversy. We shall expect hereafter that any document which the Board is asked to consider will be properly filed with the Docket Section of the Board by the attorney of record for the party involved."

The record in the Balboa case is being held open until Aug. 1 to allow National, Pan American and Panagra to come to agreement and file a proposal with the Board "related to through service between New York and Miami on National's Route No. 31, Miami and Balboa on Pan American's Latin American route, and Balboa and points on Panagra's route."

Point of Contention

A point of contention in the Panagra-Pan American situation is the through-flight agreement by which Panagra has entry to the continental United States at Miami. Panagra's certificate authorizes service only as far north as Balboa, Canal Zone, and Pan American has a route between Miami and Balboa.

Panagra also flies to Miami under a previous contractual arrangement with Pan American over that carrier's route.

CAB has said it will renew its approval of the through-flight agreement only if it becomes part of an interchange agreement between the two carriers and National Airlines. If this condition is met, the agreement will be approved until 1960, unless a decision in the government's anti-trust suit against Panagra, Pan American and Grace alters the situation before then.

No Hearing Held

The Eastern-Braniff interchange agreement has been approved by CAB without a hearing since the matter has been thoroughly examined in the Balboa case.

The Board received no objections to approval of the agreement.

As approved by CAB, the interchange provides through service between points on the New York/Newark-Miami segment of Eastern's Route No. 6 and points on Braniff's South American route.

Miami was added to Braniff's South American route as a terminal in the Balboa case, but it must be served only on through-plane flights in interchange with Eastern.

The agreement filed by Eastern and Braniff was general in nature, and the two carriers are now working out a supplementary contract covering the many details that are involved in the arrangement.

Record Airport Aid Bill Permits Funds for Terminal Construction

Federal aid for airport development of at least $60 million a year for the next four years—or $15 million more than has been available any year since the end of World War II—now appears certain.

Suspending rules for lengthy debate by an overwhelming 144 to 32 vote, the House passed legislation under which $62.5 million will be available for Fiscal 1956 and $63 million annually for the three following fiscal years ($60 million for continental and $3 million for territorial projects).

The Senate had unanimously passed a measure which would have provided $83 million for Fiscal 1956 and $63 million for the three following years (AW July 4, p. 83), but agreed to accept the House version.

New Approach

Under both measures, the Secretary of Commerce has authority to enter contracts for airport development up to the amount authorized, and Congress is obligated to make appropriations subsequently to cover them. This is a new approach. Under the 1946 Airport Act, appropriations had to be obtained before contracts could be made.

In Senate testimony, the Administration first flatly opposed the new approach. Later Under Secretary of Commerce for Transportation Louis Rothschild proposed a compromise plan of two years contract authority of $42 million annually (AW July 18, p. 114).

There is the possibility of a presidential veto. But in view of the overwhelming support for the airport development legislation by Republican as well as Democrats in Congress, observers think this is unlikely. The two top Republicans on the House Commerce Committee—Rep. Charles Wolverton and Rep. Carl Hinshaw—urged enactment during brief House debate on the measure.

"There is need for advance authorizations," Wolverton declared. "The fact that the annual appropriations made for airport projects . . . have varied considerably in amount from year to year and have always been much smaller than those contemplated by the original 1946 act has had several serious consequences.

Funds for Terminals

"Of these, certainly the most serious are to be found in the resulting failure to accomplish more than a small fraction of the public airport development required to serve the needs of civil aviation . . . however, the extreme fluctuations in the airport appropriation level have also had the unfortunate effect of shaking if not destroying the confidence of the states and their political subdivisions in their federal partner in the airport program."

The legislation, as passed by both House and Senate, directs that federal aid funds are to be available for "all" types of airports and for construction and repair of terminal facilities. This provision is directed at the policy of the Commerce Department of withholding federal aid for small airports and terminal facilities. The legislation retains the formula of the 1946 act for the allocation of federal aid: 75% is allocated to the states on a population-area basis and 25% is for the discretionary use of the Secretary of Commerce to develop projects of particular importance to a national system.

Texas-Florida Route Goes Before CAB

A new route case has been initiated by Civil Aeronautics Board to consider the need for new air service between Texas and Florida.

The Florida-Texas service case has been instituted by CAB as the result of the failure of National Airlines and Eastern Air Lines to reach agreement on a Houston-Miami interchange.

The new proceeding includes applications of Braniff Airways, Continental Air Lines, Delta C & S Air Lines, Eastern Air Lines and National for Florida-Texas routes. The case is confined to service between Miami and Houston via Tampa and New Orleans. Braniff currently flies between Houston and Miami on its South American route, but can't carry local traffic between the two points.

CAB found a public need for the Houston-Miami service in the reopened southern service to the west case decided Dec. 22, 1953, and suggested that Eastern and National file an interchange agreement for Board approval.

In spite of numerous extensions and encouragements, the two carriers have been unable to reach agreement. So CAB is going ahead with a general route case to determine how the need for service should be met.

In a parallel action, the Board set four exemption applications for oral argument. Braniff, Eastern, National and Delta have asked for exemption authority to operate the service across the Gulf of Mexico until a permanent route is awarded.

CAB has scheduled oral argument on whether the exemption is needed, whether the Board has authority to issue it, what conditions ought to be imposed and which carrier should have such an exemption.

CAB Sets Temporary Subsidy for Mohawk

Mohawk Airlines' request for a subsidy reduction has been answered by Civil Aeronautics Board action opening the local service carrier's mail rate.

The Board has put Mohawk on a temporary rate of 22.73 cents effective July 1, 1955. The new temporary rate is designed to cover the carrier's break-even need, which amounted to $497,704 for the year ending May 31, 1955. Mohawk received $740,549 in mail pay for the same period.

The Mohawk request and the CAB action coincide with inauguration of Convair 240 service on Mohawk's route system. The Board said preliminary analysis indicated the mixed operation might result in an unwarranted increase in mail pay to Mohawk under the current rate.

It has been a consistent CAB policy to refuse to underwrite added expense incurred by local service airlines in operation of equipment larger than the DC-3. The Mohawk case is a reversal of previous situations, specifically with Pioneer Airlines and Hawaiian Airlines, where acquisition of Convair or Martin equipment caused the carriers to ask for more mail pay.

Lebanon Asks Merger Of Middle East Airlines

Beirut—The Lebanese government is urging a consolidation of Lebanese and Arab League airlines to end the uneconomic monopoly-operation now in effect between these countries.

Each country operates individual services based on reciprocal agreements. The Lebanese services under these agreements are running less than 45% load factors. A single airline serving all of these countries would save approximately $1.8 million annually, it is estimated by local sources. In addition, it is believed that such an arrangement would enable cutting fares by at least 25%-35%.

S&WA Nets $242,000

Seaboard & Western Airlines earned a net profit of $242,000 during the first six months of 1955, compared with a $400,000 loss for the first half of last year. Gross revenues totaled $7,595,000, increasing from $2,333,000.

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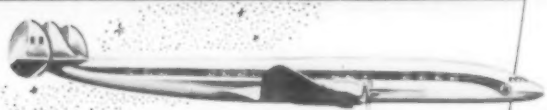
Go far back in the history of aviation to answer this question. Here are a few clues to help you along. He was born in 1890, made his first flight in 1911. As an Air France pilot, he made the first international flights from Paris to London and Paris to Brussels in February, 1919. In August of the same year he was first to fly across the Sahara desert. Recently he flew as a passenger, over the same routes in the latest Air France equipment. His name, *Lucien Bossoutrot.*

The air trails the first international commercial pilot blazed are still being flown by Air France. Today, the World's Largest Airline is celebrating its 36th anniversary of service to the people of 76 countries. We salute Monsieur Bossoutrot, the aviation pioneer who began it all!

Aloft in the Farman Aerobus February 5, 1919

Lucien Bossoutrot as he appears today



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AVIATION WEEK

THE MAGAZINE OF AVIATION BUSINESS

ROBERT W. MARTIN, JR. PUBLISHER

A McGRAW-HILL PUBLICATION
330 WEST 42ND ST., NEW YORK 36, N.Y.

July 25, 1955

MEMORANDUM TO THE AVIATION INDUSTRY

The tremendous growth of aviation has created a whole new field of needed information services. Today, because of the great expansion of our industry, a publishing task of major importance is the establishment of our industry's first comprehensive annual buyers' guide with a circulation large enough to penetrate the industry's major purchasing influences, domestically and internationally.

November, 1955 will mark the publication of the AVIATION WEEK Buyers' Guide--an annual edition that will answer the long-felt demand of our industry's buyers, in civilian, Air Force and governmental capacities

Questionnaires are now being mailed to every manufacturer of record engaged in the production and supply of aeronautical products and materials. A year-round research group under editorial supervision has been established to seek out new products, new terminologies--to check and double check the accuracy of all information to be published--the availability and actual production of all items featured.

AVIATION WEEK's annual Buyers' Guide will establish a publishing service unique to our industry. It will be complete and comprehensive--with complete listing of all manufacturers of aeronautical and allied products--not just a token listing; correct and complete addresses; sufficient cross indexing to locate any product regardless of terminology . . . and most important, the Buyers' Guide format will provide, in one complete listing, a simple, easily used method of locating any product. In addition to these important details, the Buyers' Guide will have trade name and distributor listings. These are the factors of completeness--these are the essential features that will make AVIATION WEEK's Buyers' Guide a must for every aviation purchasing influence.

I am sure you will find this annual guide the No. 1 sales and merchandising opportunity for the year-round promotion and advertising of your products, materials and services.

Your AVIATION WEEK representative will gladly give you full details on advertising rates, mechanical specifications, closing dates or any other information that you may desire.

Very truly yours,

Robert W. Martin, Jr.

Robert W. Martin, Jr.
Publisher

New York Leads Airline Traffic

Washington, D. C.—New York, Chicago and Washington led the nation's airports in aircraft departures and originating passengers last year, according to Civil Aeronautics Administration.

New York, including Newark, enplaned 3,836,634 passengers and had 137,833 aircraft departures to lead the list.

Second was Chicago with 3,044,545 passengers and 120,234 departures, and Washington was third with 1,509,963 passengers and 78,524 departures.

These three lead the list of 22 "large hubs"—cities which originate at least 1% of the national total of enplaning passengers.

New York is also the top city in number of overseas passengers originated with 319,277. Miami is second with 216,933 and Seattle third with 75,633 passengers.

Passengers that originated at the balance of the 10 leading cities are: San Francisco, 51,573; Los Angeles, 37,788; Dallas, 24,655; San Antonio, 23,920; Ft. Worth, 21,787; New Orleans, 20,018 and Houston, 20,862.

In helicopter traffic, Newark leads with 3,208 passengers enplaned. LaGuardia Airport follows with 2,623, then Idlewild Airport, 2,132, Long Beach, Calif., 113 and Los Angeles, 98.

Helicopter mail traffic was heaviest at Los Angeles with 1,364 tons and Los Angeles Terminal Annex with 1,180 tons.

Traffic at Air Mail Field, Chicago, was 926 tons and at Newark it was reported at 583 tons.

1954 Airport Traffic

	Enplaning Passengers	Aircraft Departures
New York	3,836,634	137,833
Chicago	3,044,545	120,234
Washington	1,509,963	78,524
Los Angeles	1,478,948	62,885
San Francisco	1,131,004	65,196
Detroit	891,863	52,222
Miami	886,456	29,410
Atlanta	853,968	39,887
Boston	710,964	35,409
Dallas	688,695	39,880
Cleveland	688,096	44,471
Pittsburgh	650,999	44,456
St. Louis	538,481	39,171
Denver	482,065	25,454
Minneapolis	468,877	23,385
Kansas City	461,540	30,939
Philadelphia	444,354	35,756
Seattle-Tacoma	442,402	18,084
Cincinnati	438,466	26,531
Houston	416,114	20,430
New Orleans	413,271	20,231
Buffalo	347,427	24,341

Boost Airline Role, ATA Advises

The airline industry in the United States should emphasize the constructive contribution it has made and continues to make to the American economy, according to Stanley Gewirtz, executive assistant to the president of the Air Transport Assn.

Commercial aviation today is a foundation of our economic prosperity and our national security, Gewirtz said in a speech at a meeting of the Atlanta Chapter of the National Defense Transportation Assn.

"For too long a period now," he said, "the occasion of the Civil Aeronautics Board's request to the Congress for its annual appropriation has provided a happy hunting ground for trigger-happy opponents of airline progress who, in opposing public service revenue appropriations, tell only an infinitesimal portion of the story of air transportation's phenomenal growth under progressive legislation—a growth only partially made possible through government aid."

Gewirtz pointed out that as early as 1789, the First Congress of the United States recognized the subsidy principle when it set up a system of aid to American shipping.

In the past six years, he noted, the government has appropriated in direct and indirect grants close to $4 billion for agriculture, $6 billion for business, $1.5 billion for labor and nearly $10 million in general aids.

"Airline subsidy or public service revenues, as they should be called, have paid off in producing a domestic and international air transport system, carrying the flag of the United States, which has assisted the commerce, provided an effective arm of the national defense and benefitted the postal service—all accomplished as the airlines have become increasingly self-sufficient," Gewirtz said.

Gewirtz pointed to progress made by the airline industry in improving its subsidy position.

He further noted that in Fiscal 1956 all of the domestic trunklines are virtually subsidy free, that local service subsidy has decreased 15% since service was instituted and that in Fiscal 1956 international airlines will receive subsidy amounting to only 4.8% of total revenues.

He also pointed out that critics fail to mention that U.S. international carriers compete with nationalized, subsidized foreign carriers and that the 10 most potent foreign competitors received about $800 million in subsidy between 1946 and 1953.

Adams Scores CAB's Ozark Route Study

Decision of the Civil Aeronautics Board to investigate the need for a new route for Ozark Airlines has drawn a sharp dissent from Vice Chairman Joseph P. Adams.

The Board has instituted an investigation to determine whether Ozark should be certificated to serve Peoria, Ill., and Fort Dodge, Iowa, via Galesburg, Ill., and Burlington, Ottumwa and Des Moines, Iowa. CAB will also decide whether Braniff Airways should be suspended at Fort Dodge, Burlington and Ottumwa if Ozark is given the route.

"I cannot subscribe to this 'make work' action of the majority," says Adams, "since it ignores our already overwhelming backlog, and unjustifiably discriminates against interests of other states and cities throughout the country which have been waiting for as long as nine years for new or improved airline service."

Adams points out that CAB has more than 400 cases currently on its "active" docket, many filed as long ago as 1946. He says that the Board is duplicating effort in instituting the new investigation, since the same ground was covered in the Ozark certificate renewal case decided in August, 1954.

Adams also says that the investigation will impede efforts to improve air service in a seven state area discussed in a conference between CAB and officials from Nebraska, Iowa, Illinois, South Dakota, North Dakota, Minnesota and Wisconsin.

Piedmont Wins Route

Route structure of Piedmont Aviation has been extended by Civil Aeronautics Board to include Washington, D.C., as a northeastern terminal.

Following the recommendations of its examiner, CAB has amended Piedmont's certificate by extending Segment 4 of its route from Lynchburg, Va., to Washington via Charlottesville, Va. Piedmont is restricted from serving Washington and Danville, Va., Richmond, Va., Norfolk, Va., Winston-Salem, N. C., or Greensboro-High Point, N. C., on the same flight.

The new Lynchburg-Washington route authority is effective until July 15, 1958.

The application of Staunton, Va., for air service was dismissed without prejudice at the request of the carrier.

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Atlantic Rates Lower, Simpler

The new air cargo rate structure adopted for North Atlantic operations by International Air Transport Assn. member carriers will reduce rates and greatly simplify the system of commodity rating.

The agreements, effective Aug. 15, apply to cargo moving between New York and Boston and virtually all European points, and to points as far east as Teheran on some commodities. Present general and specific commodity rates will continue to apply to North Atlantic traffic moving to Montreal and Mexico City.

The existing basic rate for general merchandise will remain at the present $2.42 per kilogram level for the New York-London basic sector, but the current breakpoint of 440 lb. will be dropped. Rate reductions have been included in the new structure to encourage volume cargo.

A key factor in the new rate structure is the simplification of classifications. Hundreds of specific rates for individual commodities have been reduced to 48 descriptions of commodity rates, each of which includes a variety of items.

With few exceptions, the new rates will apply equally eastbound and westbound in place of the current system of directional differentials applied to some commodities.

Special breakpoints now applied to various commodities will be eliminated in favor of a standard 45 kg. breakpoint on all shipments.

The new rates are substantially lower, according to IATA, than the general merchandise rate for shipments over 45 kg. The new commodity rates for the New York-London segment will range from 88 cents to $1.32 per kg.

The new rate structure is effective until Dec. 31 and is subject to modification by the IATA Commodity Rates Boards. The system will be reviewed and evaluated by the airlines when the Traffic Conferences meet in September at Miami to set 1956-57 fares and rates.

India-Iraq Air Pact

Baghdad—A bilateral air agreement will be signed soon by Iraq and India. The new air pact will give landing rights to Air India International at Baghdad and to Iraqi Airways at several Indian airports.

Iraq has authorized the Minister of Communications and Works to sign the agreement on behalf of his government, while the Indian Charge d'Affairs here will sign for India.

Riddle Asks CAB For Lower Rates

Riddle Airlines is asking Civil Aeronautics Board for permission to fly passengers for less than half established rates using Douglas DC-6Bs.

It is citing service between New York and Washington, D. C., at $8.50, about a one dollar more than first-class rail rates; $34.75 for one-way passage between New York-Miami, compared with current coach rates of $50.50 daytime and $44 at night. Riddle is basing proposed charges of three cents per passenger-mile, plus a two-dollar terminal fee.

The airline asks for terminal points at Boston and Miami, via New York, Philadelphia, Washington, Jacksonville, Tampa-St. Petersburg, Orlando and West Palm Beach.

The airline now operates some C-46s on its cargo schedules between New York-Miami-Puerto Rico.

Taloa Asks Board For 5-Yr. Exemption

Transocean Air Lines has asked Civil Aeronautics Board for an exemption to operate international passenger and cargo charters and special services to supplement scheduled air carriers.

Taloa said the exemption should be for a minimum of five years or until it is granted a certificate in a CAB decision on the Large Irregular Carrier Case. The nonsked requested permission to operate:

- **Worldwide charter flights** on an unlimited basis.
- **Three special round trips** a month between the U. S. and foreign countries.
- **Overseas services** in a continuation of its present authority that grants a maximum of eight round trips a month. Transocean has been operating flights between California and Hawaii under this authority.

New Fees Slated At Italian Airports

Rome—The Italian parliament is considering and is expected to pass a bill revising airport fees.

To land at a government airport, international commercial aircraft will pay fees not exceeding 62 cents per ton or fraction thereof for the first 25 tons of gross weight, rising to 95 cents per ton for each additional ton or fraction. Rate for international private aircraft carrying tourists will be 62 cents for aircraft weighing 2,000 lb. to $1.24 for each plane weighing over this limit. Charges are increased by 50% for night takeoffs or landings.

For each hour of service or fraction thereof, a charge of $1.25 per worker will be imposed. A charge not exceeding approximately $1.75 will be imposed for each passenger going aboard from an Italian government airport. A fee of 15 cents will be charged for each 2.2 lb. of cargo loaded on an airplane for foreign delivery; a like charge will be made on the addressee for the same weight being discharged from an international airplane unloading at an Italian government field.

New PAA Record

Pan American World Airways carried 14,760 passengers between the U. S. and Europe during June, a new monthly record for trans-Atlantic traffic.

Announcing the new all-time high, PAA Vice President Willis G. Lipscomb said demand for seats on PanAm's new Douglas DC-7Bs contributed to the increase in traffic volume.

Peak was reached during the last week of June when approximately 3,900 passengers were flown from the U. S. to Europe, compared with 2,913 persons traveling on eastbound PAA flights in the same period last year.

The airline's trans-Atlantic transports logged more than 50 million passenger-miles during the record month.

Vietnam Gets U. S. Aid

Vietnam will get U. S. assistance in modernizing its air transport facilities under a grant from the International Cooperation Administration.

ICA is directly providing $433,500 and $185,715 from counterpart funds to help South Vietnam develop its transport facilities and make new communication and air navigation equipment available.

Modern electronic equipment is being purchased through the Civil Aeronautics Administration, and ICA has sent three CAA technicians to Vietnam for six months to aid in planning an improved commercial and air navigation network.

Vietnamese aviation personnel will be trained in various traffic and communications techniques in Saigon, Taipei, Manila and the United States. The first group of 20 technicians has started language instruction in Saigon and will be sent to Taipei or Manila for training in aeronautical electronics techniques.

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CAB ORDERS

(July 7-13)

GRANTED:

Flying Tiger Line an exemption to perform a charter flight from Amsterdam to New York, with certain provisions.

United Air Lines leave to intervene in the Southwest Airways permanent certification case.

Los Angeles Chamber of Commerce leave to intervene in the airfreight renewal case.

APPROVED:

Los Angeles Airways' flight pattern revision suspending certain flights and adding two round-trip shuttle passenger flights between Los Angeles International Airport and Pomona and two flights between Los Angeles and Anaheim/Fullerton.

Agreements between Delta C&S, American Airlines and various other carriers relating to inter-carrier arrangements.

ORDERED:

Wien Alaska Airlines' temporary mail rate fixed at the rate proposed by the CAB in its show cause order for the period starting July 1, 1955.

Cordova Airlines' temporary mail rate fixed at the rate proposed by the CAB in its show cause order for the period starting July 1, 1955.

Caribbean-Atlantic Airlines' temporary mail rate fixed at the rate proposed by the CAB in its show cause order for the period starting July 1, 1955.

Capital Airlines' exemption permitting free transportation to technical representatives of Bell Telephone Laboratories extended for six months from July 20, 1955.

Northern Consolidated Airlines' temporary mail rate fixed at the rate proposed by the CAB in its show cause order for the period starting Jan. 1, 1955.

Investigation of airline practices of charging full adult fare for transportation of unaccompanied children.

DISMISSED:

Braniff Airways' application in the New York-Florida service case, at the request of the applicant. Braniff is granted leave to intervene in the proceeding.

Feeders Fly 51 Months Without Fatal Mishap

Scheduled airlines operated with a passenger fatality rate of .20 per 100 million passenger-miles in the 12 months ending June 1955, Air Transport Assn. reports.

Fatality rate for domestic airlines was .23 per 100 million passenger-miles, and the rate was .05 for international operations.

Both domestic trunk and international airlines had flown for three months without a fatal accident at the end of June. At the same time, local service airlines were fatality free for 51 months, and territorial airlines had operated 305 months without a fatal accident.

During the 12 month period ending in June, the U.S. scheduled airlines flew 38,525,000 passengers 22,825,251,000 passenger-miles. Domestic trunklines flew 18,197,451,000 passenger-miles, international lines flew 4,036,503,000 passenger-miles, local service 505,142,000 passenger-miles and territorial airlines 86,155,000 passenger-miles.

Carrier to Cease Using Westair Name

Offer of Aviation Corporation of Seattle to cease using the name Westair has been accepted by Civil Aeronautics Board and the Western Air Lines complaint against Westair has been dismissed.

Western filed a complaint with CAB that Westair Transport, the name Aviation Corp. of Seattle was using, was painting its aircraft with the name Westair in a manner which caused confusion with Western's markings.

Last month, Westair offered an agreement to remove the word Westair from its aircraft within 30 days and to discontinue offering air transportation under the single name Westair within the same period.

CAB has accepted this offer of settlement and has dropped Western's complaint.

Illegal Stop Charge Denied by Eastern

Eastern Air Lines has denied a National Airlines charge filed with the Civil Aeronautics Board that Eastern conducted an illegal charter flight between Miami and Havana.

National has complained to CAB that Eastern operated a charter flight between Miami and Havana last month without required consent of National or authority from the Board.

Eastern says the stop at Miami was made on the return trip of a charter flight between Louisville, Ky., and Havana carrying 80 young people, their supervisors and members of the press.

The flight was a good will trip made in the interest of better relations between the youth of Cuba and the youth of the United States, according to Eastern.

Eastern contends that there is no carrier certificated between Louisville and Havana, and therefore no consent or authority is required. Eastern maintains that the Miami stop on the return trip of the type condoned by CAB in the Resort-Miami stopover investigation.

SHORTLINES

▶ **Austria and Israel** concluded a civil aviation agreement providing reciprocal facilities for El Al Israel National Airlines and a future Austrian airline. El Al currently operates a weekly service to Vienna.

▶ **Braniff Airways** flew 59,875,244 revenue passenger-miles in May, an increase of 18% over May, 1954. Load factor increased from 58.35% to 59.58%. Express and freight ton-miles increased 16% to 524,242.

▶ **British Overseas Airways Corp.** has moved into new headquarters at London Airport. The new building houses four large hangers, maintenance facilities and offices for 4,000 employes.

▶ **Northwest Airlines** carried 1,143 passengers between the U.S. and the Orient in May, compared with 639 in May 1954. Northwest added a round-trip flight July 1, bringing the weekly schedule to four combination class round-trips with NWA Super Constellation equipment and one with DC-6B equipment.

▶ **Riddle Airlines** hauled 10,248,552 lb. of freight in the first six months of 1955, 16% more than in the first half of last year.

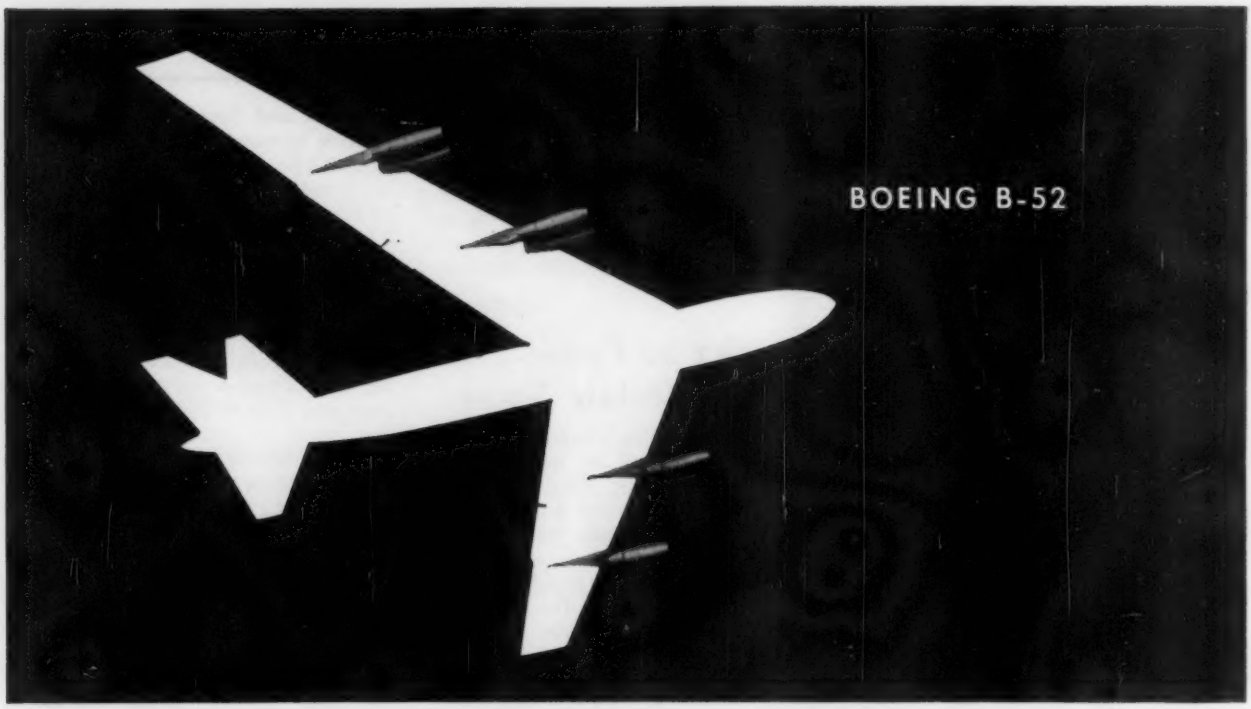
▶ **Sabena, Belgian airline,** will put its winter schedule into effect Oct. 2. Six flights a week are scheduled over the North Atlantic, three via Manchester and three via Shannon.

▶ **Swissair** is fitting its aircraft with "P-6", a chemical device for eliminating food and tobacco odors.

▶ **Trans-Canada Air Lines** reports 50,000 passengers have flown on its Viscounts since service started Apr. 1. Viscount load factor was 81.5%, compared with a system load factor of 72.6% for April, May and June. TCA carried 30,378 passengers on its New York-Toronto route in the first three months of Viscount service, a 3.26% increase over the same period last year.

▶ **Trans-Texas Airways** had a load factor of 41.5% in June, compared with 31.76 for the previous month. TTA carried 13,970 passengers in June and 72,601 passengers in the first six months of this year.

▶ **Trans World Airline** loaded 9,740 eastbound international passengers last month, an 11.4% increase over June, 1954.



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EDITORIAL

The North American Case: A Mockery

The airlines are a federally-regulated industry. If the established economic and technical regulations that govern operations of the air transport industry are not enforced chaos would soon result.

Thus the Civil Aeronautics Board had little choice in reaching its 4 to 1 decision to revoke the operating authority of North American Airlines and order this airline to stop its illegal operations immediately. The Board was in unanimous agreement on the issues that North American Airlines was violating the Civil Aeronautics Act and that it must be punished for these violations. In filing a minority report, Member Joseph Adams took issue with the majority only on whether the punishment proposed for North American was too severe and whether the public would suffer from lack of a competitive fare yardstick.

Guilty on Four Counts

The Board found North American Airlines guilty on four major types of violations that taken together made revocation of operating authority inevitable. The Board also found that the four principal individuals involved in the case had illegally acquired control of four irregular carriers (Twentieth Century Airlines, Trans National Airlines, Trans American Airways and Hemisphere Air Transport); merged the properties without Board approval and operated a single integrated carrier without a certificate of public convenience and necessity as required by law for this type of operation.

It is worth repeating some of the things said by the Board majority on this North American Airlines enforcement case.

"When we cut through the web of inter-company dealings and technical devices employed by the respondents it is perfectly clear that the respondents have attempted to make a mockery of the Board's regulations and to operate without regard for the requirements of the Civil Aeronautics Act.

"No amount of pious protestations by respondents can now obscure the fact that they deliberately embarked upon an involved scheme to operate a regular scheduled transcontinental air transport business without a certificate of public convenience and necessity or other appropriate operating authority . . .

"And now with the same degree of legal legerdemain employed in constructing the North American combine, respondents have resorted to a multiplicity of technical legal arguments in an attempt to escape the consequences of their unlawful activities."

North American Airlines has been operating what it candidly admits is a scheduled air coach service on high density traffic runs such as the transcontinental and New York-Miami routes. In 1954 North American flew 329,476,000 passenger-miles with a fleet of seven DC-6, DC-4 and DC-3 aircraft. This compares with 7,275,000,000 coach passenger-miles flown by U. S. certified carriers during the same year. North American was interested only in the high density traffic routes where by price cutting it could skim some of the cream from the existing air transport market. It had no responsibility to serve less profitable points that are part of the "public convenience" responsibility shouldered by certificated airlines. And North American displayed no interest in serving anything but the richest route segments.

North American officials know that their operations violated the law. They blandly contended that the law should be changed and ignored it while pursuing their "cream skimming" operations, confident that CAB inertia, legal maneuvering and political pressure would stave off the inevitable day of reckoning until the principal individuals involved had made their fortune.

There are many people and organizations in aviation today, including certificated carriers and airline manufacturers, who do not like the Civil Aeronautics Act and are actively working for its change. The legislation proposed by the late Sen. Pat McCarran and now by Sen. Warren Magnuson have provided a proper means of affecting changes in this law. However, we know of no other aviation organization except North American Airlines which contends that it should be exempt from existing laws while seeking to have them changed.

Future Issues Loom

By taking firm action against North American Airlines and forcing it to face the consequences of its deliberate flouting of the Civil Aeronautics Act, the Board has cleared the way for consideration of the genuine problems concerned with the future expansion of air transport without blurring this picture by an enforcement problem.

These issues include developing an effective method of entry into the air transport business. No industry as dynamic as air transport can effectively close the door on new ideas or new methods of exploiting its potential services. The role of irregular or non-scheduled carriers in the overall transport picture needs sharper definition that will also provide real economic opportunity. The Board must exhibit more sensitivity to public convenience and the public's future needs and less concern with precedent and tradition in charting new regulatory courses for the continued growth of air transport.

—Robert Hotz

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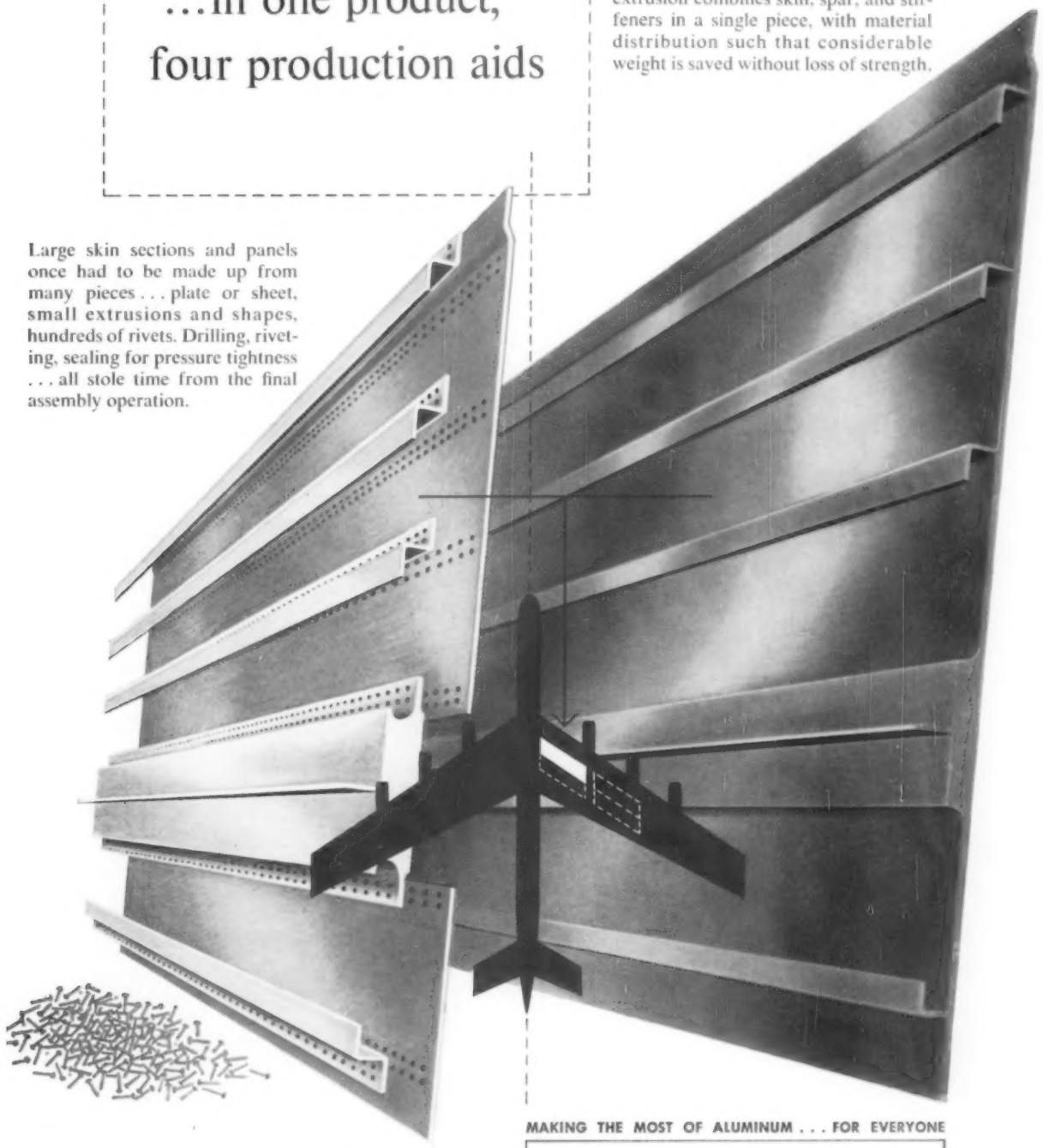

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